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Monthly Message

Interdepartmental Committee on Nutrition for National Defense

The Interdepartmental Committee on Nutrition for National Defense (ICNND) was formed in 1955 following an initial nutrition survey of the South Korean Army and several surveys in Taiwan. The Departments of State; Defense; Agriculture; Health, Education, and Welfare; and the International Cooperation Administration entered into a formal voluntary agreement as sponsors. Inasmuch as it was originated by the Department of Defense, which also supplies a major share of the funding, this office assumed the chairmanship. The group was later joined by the Atomic Energy Commission. The National Institutes of Health supply the offices and the position for an executive secretary, first filled by the late Dr. Harold Sandstead, and now by Dr. Arnold E. Schaefer.

Conversations were held with various universities, alumni associations, pharmaceutical houses, and states and municipalities, so that working members of the survey teams could be available as needed.

The mechanism of a survey is: The Department of State receives a formal request for a survey in a given country through our ambassador. Following transmission of the request to the Committee, arrangements are then made between a team assembled from our consultants and through our ambassador in the host country. A preliminary visit is arranged by the Assistant Secretary of Defense (Health and Medical) or his deputy, and Dr. Schaefer. Here talks are held with our ambassador, our Point IV (ICA groups), and with various ministers and members of the armed forces within the host country. A time for the survey is arranged and the areas for work selected. The survey lasts approximately 2 months and the host country supplies counterpart members from its armed forces, health agencies, and laboratory staffs to work with the American team. The words "National Defense" mean the *defense of that country*, as it is realized that proper nutrition is the basis of good physical condition for people everywhere.

Such surveys have already been made in Spain, 3 countries in the Near East, 2 in Africa, 3 in the Far East, and 2 in South America, and plans are already under way for others in the Far East and South America.

In addition to the initial survey, a follow-up is part of the program. In the Near East a permanent annual nutrition conference has been arranged on rotation basis.

Other positive accomplishments are:

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Foreword

The *United States Armed Forces Medical Journal* is a monthly publication of professional and administrative information for medical personnel of the Department of Defense. The Assistant Secretary of Defense (Health and Medical) and the Surgeons General of the United States Army, Navy, and Air Force invite members of the regular and reserve medical services, the professional consultants of the military departments, and other physicians and health scientists with an interest in Department of Defense activities to submit manuscripts for publication in this *Journal*.

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Diagnosis of Radiation Injury and Analysis of the Human Lethal Dose of Radiation

EUGENE P. CRONKITE, M.D.
VICTOR P. BOND, M.D., PH.D.

THE DIAGNOSIS of radiation injury may be considered as either extremely simple or extremely complex. In the first place there is nothing that is specific for radiation injury. The early symptoms of nausea, vomiting, weakness, and changes in pulse rate and blood cal standpoint.[1-4] In a general sense, subjects with intractable and infectious diseases. The value of the early symptomatology has been considered repeatedly and analyzed in some detail from a practical standpoint.[1-4] In a general sense, subjects with intractable nausea, vomiting, and diarrhea will have a mortality approaching 100 percent. This category has been called the *survival improbable* group. Subjects in whom nausea and vomiting is relatively brief, subsiding within a period of 1 or 2 days and followed by a period of well-being, have a statistical chance of survival. In these patients, after the subsidence of the initial symptoms, a series of events referable to the blood-forming tissues is occurring. These people are in the lethal dose range in the classic pharmacologic sense, and are categorized as the *survival possible* group. A third group consists of those who have either no initial symptoms or mild and fleeting ones, disappearing within a few hours. Unless they have sequelae of marrow depression, these patients will show no further subjective effects of irradiation. This category has been termed the *survival probable* group and does not in general constitute a therapeutic problem. All the preceding discussion is based upon the assumption of pure radiation injury without traumatic injuries.

From Medical Research Center, Brookhaven National Laboratory, Upton, N.Y. Presented on 9 May 1959 in a symposium, "The Acute Radiation Syndrome," at the U.S. Naval Medical School, Bethesda, Maryland. This work was supported by the U.S. Atomic Energy Commission.

The typical blood changes of leukopenia, thrombopenia, anemia, hemorrhage, and aplastic marrow, with concomitant bacterial infections, are similar in many respects to the sequence induced by chemical intoxication, by some infectious diseases, or by idiopathic depression of the marrow. When these changes occur in close relationship to a known large exposure to ionizing radiation, the diagnosis of radiation injury is quite simple. However, when the exposure is less or unsuspected, the diagnosis of radiation injury is extremely difficult.

HEMATOLOGIC TESTS OF RADIATION INJURY

The detection of chronic or low exposure radiation injury is primarily a physical problem. However, there are nonspecific but useful hematologic indices of probable exposure. The first is the detection of bilobed lymphocytes, as demonstrated by Ingram and Barnes.[5] This is a tedious procedure. The normal incidence of bilobed lymphocytes is exceedingly small. To detect significant increases necessitates the concentration of the leukocytes in the blood, an excellent stain, and the enumeration of approximately 50,000 cells. In the skilled and patient hands of Ingram and associates, this has been a most useful and practical procedure for the detection of exposure to tiny amounts of radiation. It could become a most useful and widespread procedure if it were practical to develop electronic devices to make the counting automatic. This problem is currently under study by Ingram's group.

A second potentially useful procedure consists of the hematologic studies proposed by the Swedish workers.[6-8] They have studied the blood counts of animals and humans exposed to tiny amounts of radiation, and with a statistical analysis of the variation around the mean, they have established criteria for exposure in the range of a fraction of a roentgen. They have noted that the detection of small amounts of radiation is also probably dose-rate dependent. If the latter is shown to be uniformly true, this will introduce another parameter into the establishment of safe permissible doses.

A third potentially useful procedure following exposure to larger amounts of radiation is the determination of the number of desoxyribonucleic acid-(DNA-)synthesizing cells that are present in the peripheral blood, as developed by Bond and co-workers.[9] This procedure has been used in irradiated dogs and the pattern established.[10] This pattern is very similar to the one that was observed in the Y–12 radiation casualties at Oak Ridge.[11] However, this procedure will have limited usefulness because of the long interval from the time the

blood smears are prepared until the film is exposed, developed, and stained, and one can enumerate the number of DNA-synthesizing cells. Under present conditions this takes approximately 2 weeks. Accordingly, the procedure will not have any direct practical application. It has been shown in dogs, rats, and man, however, that a definite sequence of events occurs and may even be dose dependent.

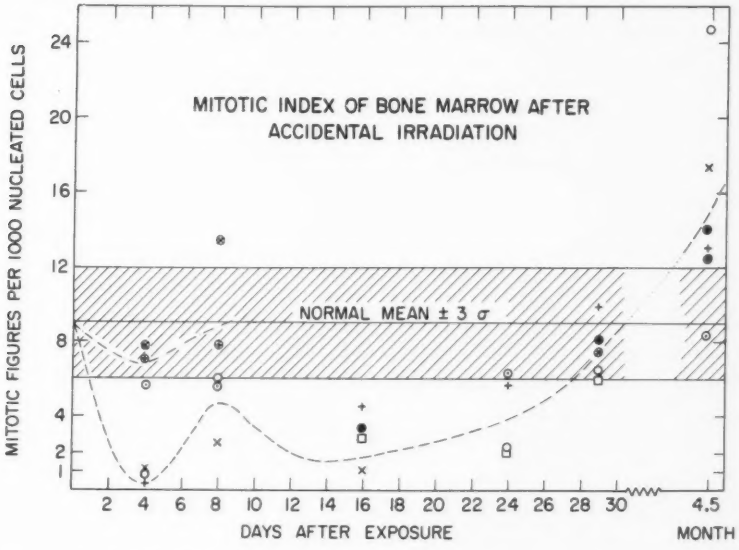

Figure 1. Serial mitotic index of bone marrow in human beings after exposure to mixed nuclear radiation from a criticality accident (Oak Ridge Y–12).

A fourth very useful procedure in the intermediate dose range, where there is no physical measurement, is the serial determination of the mitotic index of the bone marrow. The mitotic index of normal human bone marrow between the hours of 1000 hours to 1300 hours is approximately 9 per 1,000 cells.[12] The opportunity to study the casualties in the Y–12 accident demonstrated that in the range of 50 to 200 rad there is a progressive decrease in the mitotic index. The time sequence in the decrease in the mitotic index is shown in figure 1. It is noted that on the fourth day there is minimum value in the higher dose range followed by an abortive rise, a secondary fall, and ultimately a slow recovery to the normal range by the thirtieth day. The unexpected observation was made that at 4½ months after exposure, a significant increase in the mitotic index above the

normal range was found. Figure 2 shows the apparent dose dependence of the depression. Admittedly these studies are very rough and further laboratory work in animals is necessary to establish these various relationships more firmly. From a practical standpoint, the use of the mitotic index would necessitate serial studies at the same time interval each day. This procedure, we believe, has practical application because in skilled technical hands an answer can be obtained in 6 to 8 hours.

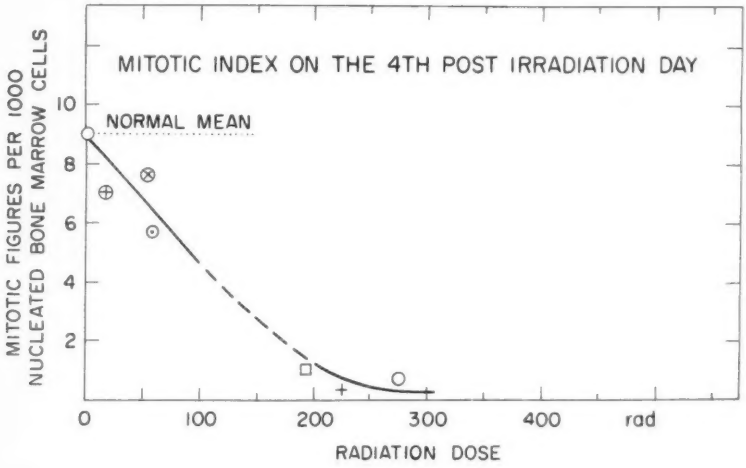

Figure 2. Apparent dose dependence of mitotic index of bone marrow after exposure to mixed nuclear radiation.

Practical experience in the Marshallese accident, the Los Alamos accident, the Argonne accident, and the Y–12 accident has amply demonstrated that physical measurements take considerably longer because of the difficulties in reconstructing the accident, making dose measurements, and computing the probable dose. Thus, in our opinion, if a bone marrow aspiration were performed immediately after exposure and thereafter at daily intervals, one would detect exposure to radiation in the 50 to 200 rad range. It is our belief that a mitotic index that approaches zero by the fourth day indicates exposure in the range of 200 rad or more and that serious consequences can be anticipated. In addition to straightforward enumeration of the mitotic figures, the qualitative description is also useful. Very soon after irradiation one can see mitotic bridges, fragments, stickiness, and clubbing of the chromosomes.

Under conditions where there are only a few casualties, it would be quite a simple matter to do all the hematologic procedures and numerous other excretion studies that might be of value, such as beta aminoisobutyric acid.[13] In the event of a major radiation catastrophe,

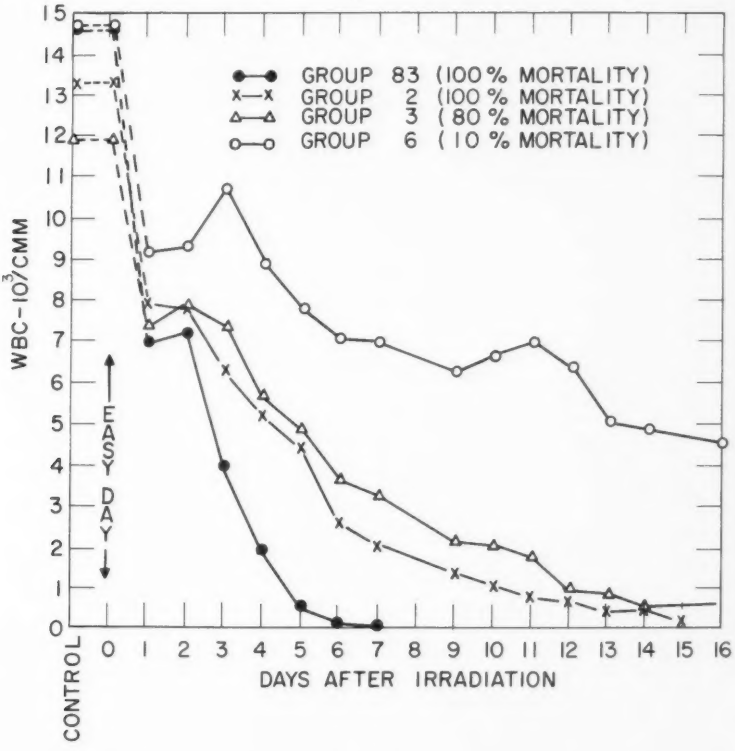

Figure 3. Serial leukocyte counts on dogs after different doses of atomic bomb gamma radiation, Operation Greenhouse. Approximate doses: Group 83—800 r, Group 2—500 r, Group 3—400 r, and Group 6—200 r.

however, it would be completely impossible to do extensive studies, although it would be practical, with the modern electronic counting devices, to do many leukocyte counts. The question arises as to whether the leukocyte count has any significant prognostic value. In the first place, at Operation Crossroads it was clearly demonstrated that there is a correlation between the depression in the leukocyte count and the distance from the bomb.[14] The problem was shown per-

haps even more clearly at Operation Greenhouse, where dogs were irradiated at different distances from a nuclear device under conditions providing protection against trauma and thermal injuries. Figure 3 shows leukocyte count plotted against days after exposure. In this case the total leukocyte count is plotted. The decrease in the count after the first 24 hours, however, is exclusively accounted for by the neutrophilic cells, since lymphocytes had reached their minimum values within 24 hours after exposure. There were four groups of dogs, with mortalities of 10 percent, 80 percent, 100 percent, and 100 percent. In the group with the highest exposure, about 800 rad, a very rapid decrease in the total leukocyte count to essentially zero was noted. All these animals were dead by the tenth day after exposure. Group 2 received a lesser dose of radiation of about 500 rad, and the smaller decrease in the leukocyte count is evident. Group 3, with an 80 percent mortality, received an approximate dose of 400 rad, and a slightly more rapid fall is noted. In group 6, which was exposed to about 200 rad and had a 10 percent mortality, the smallest decrease in the leukocyte count is evident. Comparative leukocyte counts on the seventh day would have given very valuable information on prognosis for a given group. One cannot make strict extrapolations to man because the rate of change in leukocytes in man, as shown in the Marshallese and various clinical experiences,[4, 15–17] is much slower. The studies by Jacobs and his group,[18] which analyze the leukocyte counts performed in Hiroshima and Nagasaki, although very crude in nature because of the chaotic conditions that existed after the detonation, show a correlation between survival and depression in the total leukocyte count at various time intervals.

THE 50 PERCENT LETHAL DOSE OF RADIATION FOR HUMAN BEINGS

There are various needs for a more precise knowledge about the 50 percent lethal dose of radiation and the slope of the lethal dose curve in man. The effectiveness of military planning, and the utilization of tactical or strategic devices or wide-area fallout fields for military purposes cannot be realistically appraised without this knowledge. The mortality response of man to radiation is not known with any degree of precision. In the first place, one must think of the LD_{50} in the classic pharmacologic sense—in other words, the mortality response to radiation in the absence of treatment and other complicating factors. If one can establish the mortality response with some certainty, then one can estimate what the mortality would be in terms of therapy or complicating traumatic and thermal injuries. The

currently stated LD_{50} of about 450 r was reached by rather devious means. At the present time there are two conflicting opinions on the mortality response of man. On the one hand, those investigators wishing to use radiation for therapeutic purposes to eradicate the antibody response prior to homotransplantation would like a high LD_{50} in order to have a better chance for a successful transplant and for survival of the subject. On the other hand, from the standpoint of military operations on the offensive side, it would be desirable to have a low LD_{50}. This would increase the effectiveness of fall-out and of prompt irradiation from small tactical devices. Again, from the standpoint of operating with troops in a fall-out area, it is desirable to have a high LD_{50} in order to have fewer restrictions upon the movements of troops in a fall-out area or upon the use of civilians in civil-defense rescue operations. The situation is not much improved over that in 1947, when Newell [19] tried to get the opinion of radiologists on the 50 percent lethal dose of radiation in man. The estimates varied widely.

There are several sources of data that bear on the LD_{50} value for man, and each has serious shortcomings. These sources include radiation mortality data on large animals, the data from the Japanese exposed at Hiroshima and Nagasaki, the Marshallese data, and data from patients given therapeutic total body radiation. Each of these sources will be considered below.

The effect of geometry of exposure and energy of radiation on the mortality response has been extensively considered.[19-22] Bond and Robertson [22] made the general observation that small mammals appear to have a high LD_{50} whereas large animals have a low LD_{50}. This would argue for a relatively low LD_{50} value for man; however, extrapolation from animals to man is complicated. In principle, at least, we might think that in Hiroshima and Nagasaki, where so many individuals were exposed, one would have a rather good idea of the radiation LD_{50} for man. This is not the case, however, because of the complicating factors of trauma, thermal injuries, poor nutrition, and a great difference between the devices in Hiroshima and Nagasaki—one device having a high, and the other a low neutron component. In addition to these factors, knowledge of the position of the individuals, the yield of the device, the shielding, and the relative effectiveness to be given to the fast neutron component is unsatisfactory.

An approach to the problem of the LD_{50} of man can be made by looking at the Marshallese data and the general response of all mammals. Figure 4 shows a typical dose mortality curve for mam-

mals. By applying certain general principles, one can estimate from the Marshallese data [4] the near maximal sublethal dose for man. This estimate tends to anchor the lower part of the curve at around 200 rad. Certainly in dogs and swine, if the dose of radiation were increased by 100 rad over that received by the Marshallese, one would be well up into the lethal dose range. If one adds 50 rad to the estimated 175 rad that the Marshallese received, one has a low

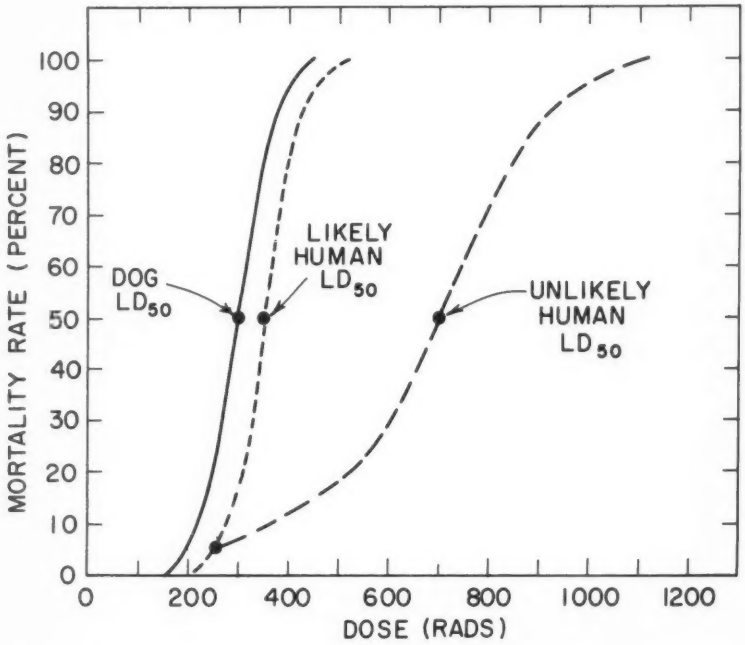

Figure 4. Deduction of likely and unlikely radiation LD_{50} curves for human beings assuming that human curve has same slope as dog and that lower end is established by Marshallese and clinical data.

lethality rate of about 5 to 10 percent, at approximately 225 rad. If one uses the same slope for man as for dogs, the 90 percent mortality is about 500 rad. By splitting the difference, one can deduce an LD_{50} of approximately 360 rad as an LD_{50} for man in the absence of complicating thermal injuries, trauma, or therapy. It should be noted, however, that the estimation of the dose of radiation received by the Marshallese carries a large possible error.

According to data from patients given therapeutic total body radiation,[15-17] severe hematopoietic depression occurs at dose levels of about 200 r. This also would argue that the LD_{50} may be relatively low, although of course the subjects receiving these exposures are diseased.

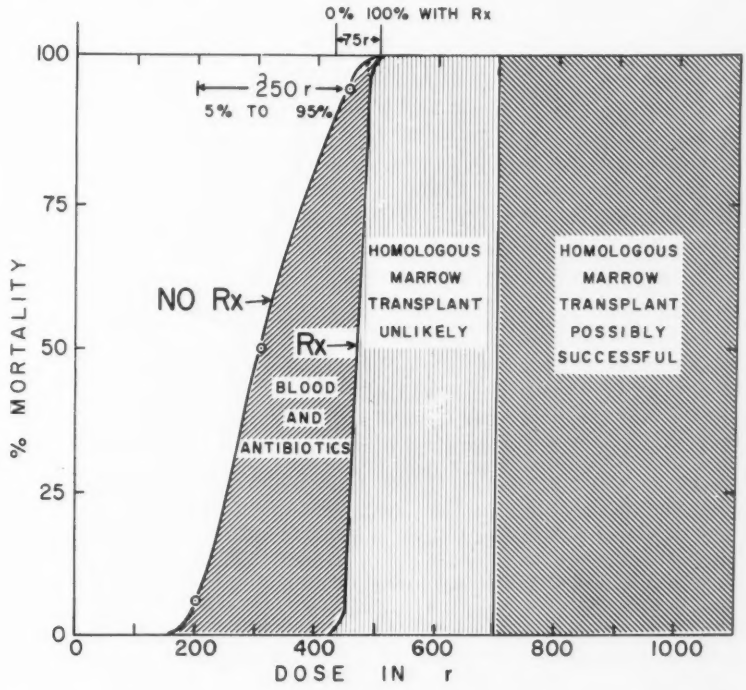

Figure 5. Schematic presentation of the possible effect of various types of therapy upon the x-ray lethal dose curve of the dog.

In reviewing the Japanese data and trying to establish the precise dose to various groups at Hiroshima, Harris[23] has concluded that the LD_{50} for man is about 700 to 800 r air dose. In our opinion, the position of the subjects, the RBE for fast neutron components, the air density, the yield of the device, and the relative shielding for gamma rays and neutrons are not accurately known. Accordingly, increasing the LD_{50} is not justified, particularly in view of evidence that suggests that the LD_{50} should be lowered. Finally, the unknown factors listed above can partly be determined only by detonation of

another Hiroshima type device and performance of the appropriate physical and biologic studies.

By looking at figure 5, one can get an appreciation of how the spontaneous course of radiation injury may be influenced by therapy. The typical sigmoid dose mortality curve for dogs is represented by the solid line with circles entitled "No Rx." The LD_{50} is about 300 r. A dose of 200 r is about 5 percent mortality and 450 r is 95 percent mortality. The range between 5 percent and 95 percent is approximately 250 r. By the simple well-established administration of blood and antibiotics when clinically indicated, as shown by Sorenson and co-workers [24] and by Perman and associates,[25] the 90 percent mortality can be reduced to approximately a 10 percent mortality. The over-all effect is essentially that of elevating the LD_{50} to about 450 r, making the dose mortality curve even steeper than it was before. Above 500 r it has not as yet been possible by the use of blood and antibiotics to increase the survival rate significantly. At this level the doses of radiation are not sufficiently high to eradicate the immune response, and the probability of successful homologous marrow transplantation is poor. After doses above 700 to 800 r, the immune response is approaching eradication and the possibility of successful homologous transplantation increases. The effect of trauma and thermal burns upon the spontaneous course would appear to be a further decrease in the dose mortality response.[20, 26]

SUMMARY AND CONCLUSIONS

In addition to physical estimates, there appear to be many useful biologic indices of exposure to radiation. Of particular importance, because of the rapidity with which it can be done and the rate at which significant differences develop, is the mitotic index of bone marrow. Of the single blood determinations, a white blood cell count is probably the most useful if complete studies cannot be performed.

Data at present are inadequate for a realistic assessment of the LD_{50} for man. In considering the LD_{50}, one must consider the geometry of the exposure and the manner in which dose is expressed. The LD_{50} in terms of air dose may be quite different from an LD_{50} quoted in terms of tissue or absorbed dose. Obviously the lethal dose values for treated and untreated individuals must not be confused. It is probable that the LD_{50} for man should not be increased from the currently quoted 400 to 450 r. It is probably about a 350 r tissue dose, under conditions of fairly uniform dose distribution throughout the body and at a fairly rapid dose rate. If a population is ex-

posed to about 200 r or more, one may expect serious consequences. Many persons would be incapacitated for varying time intervals after the exposure, and medical care and treatment would be needed. From a practical military and civil defense planning standpoint, it appears that the current estimate of 400 to 450 r for the LD_{50} for man should perhaps be lowered. Af any rate the data are not adequate to indicate that it should be significantly increased. With lower dose rates, possibly less than 1 r per minute and in exponentially decaying fields, the LD_{50} may increase. However, the precise dose-rate effect relationship for man is not known.

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PENKNIFE OR SCALPEL?

A coronary room in at least one hospital in every community offers the opportunity to save a gratifying number of lives each year. A chest can be opened, even on a golf course, by any physician who understands his obligation and who has a penknife in his pocket. The brain can be kept alive by cardiac massage and collapse of lung can be prevented by mouth-to-mouth inflation. But the task can be accomplished much more neatly in a room equipped with such things as monitoring devices, positive pressure apparatus, thoracotomy trays and personnel ready to go to work within seconds.—The Coronary Room (editorial). *Northwest Medicine*, April 1959.

Hazards of Tattooing

Report of Two Cases of Dermatitis Caused by Sensitization to Mercury (Cinnabar)

LIEUTENANT RICHARD GRAHAM DAVIS, MC, USN

DECORATIVE TATTOOING is common in the population of the United States. Although there are no comprehensive data on the frequency of this practice in large civilian or military groups, a review of 9,150 autopsy protocols from a large general hospital [1] suggests that about 1 white American male adult in 10 bears at least 1 tattoo on his body. This, however, is a sample of a selected socioeconomic group; furthermore, these autopsies were completed by 1924, and the popularity of tattooing varies from time to time.[2] Among service personnel, traditionally the best customers of the tattoo artist, the incidence is probably higher, but recent inquiry of official sources [3–5] revealed that they had no precise figures. In reference to World War II and the prolonged period of conscription that followed it, Buncke and Conway [6] state flatly: "Approximately 65 percent of enlisted men in the United States Navy and 25 percent of enlisted men in the United States Army became tattooed while in the service." Although these figures seem rather high for a general average, Smith [7] found, in 1950, that 61 (30.5 percent) of 200 Army enlisted men hospitalized in the Canal Zone were tattooed. It must be noted, however, that the incidence of tattooing in a small or relatively isolated group of servicemen is influenced by many factors, such as local custom, availability of professional tattoers, and the degree of social acceptability of tattoos among members of the group. For example, the special circumstances of prolonged detention in prisoner-of-war camps were associated with outbursts of tattooing as a fad to relieve boredom in both World Wars.[8, 9]

From U.S. Naval Air Station, Port Lyautey, Morocco. Lt. Davis is now assigned to U.S. Naval Hospital, Bethesda, Maryland.

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Whatever may be the true statistics of tattooing, the medical complications are significant in number and of particular interest to medical officers. The purpose of this article is to review these complications briefly, to discuss the commonest form in some detail, and to report 2 typical cases.

FREQUENCY AND NATURE OF COMPLICATIONS

Serious complications caused by the process of tattooing and by the tattoo itself are rare. Some idea of the relatively low frequency of severe complications may be had from the fact that although the art is ancient, the first authentic report of its medical aspects was made only in the last century.[10] In the course of time, however, a number of phenomena of medical significance have been found to be associated with tattoos, and the literature has become rather extensive. Only the most pertinent or noteworthy references are cited here; however, readers will find interesting reviews in the monograph by Cattani,[8] and in articles by Schönfeld, [11, 12] Rukstinat [1] and Beerman and Lane.[13] The present-day incidence of complications of tattooing in the population can only be guessed at. For the military, Dr. H. M. C. Luykx [5] (chief, Biometrics Division, Office of the Surgeon General, U.S. Air Force) calculates that between 6 and 10 cases per year per 100,000 U.S. Air Force population can be expected to be admitted to a medical facility for excision of tattoos. Many of these excisions probably will be performed for cosmetic rather than for purely medical reasons, but undoubtedly some will be for complications.

Several methods of classification of the medical complications of tattooing, based on etiologic or pathogenetic mechanisms, or on time of onset of symptoms, have been proposed.[13–18] They are not wholly satisfactory because none of them is entirely inclusive. An attempt has been made to combine and elaborate on previous classifications in tabular form, and to indicate the frequency of these complications (table 1).

Trauma

The immediate result of tattooing is simply the normal inflammatory response of the skin to multiple, closely set puncture wounds, or needling. Ordinary vaccination for smallpox or BCG vaccination by multiple punctures produces the same picture in miniature. The response subsides rapidly if no adventitious disease occurs. A fresh tattoo, even one covering an extensive area, presents only local edema, a

Table 1. ***Medical complications of tattooing***

Etiologic or pathogenic factors	*Time of onset of symptoms*	*Remarks*
I. TRAUMA Inflammatory response caused by puncture of tattooing needle	Immediate (hours)	Inevitably present in varying degrees
II. PYOGENIC INFECTIONS		
A. Superficial pyodermas Impetigo Furunculosis Ecthyma Acne varioliformis	All early (days)	Minor, local, short-lived lesions frequent; extensive or significant infections uncommon
B. Deeper infections Erysipelas Cellulitis Gangrene Septicemia	All early (days)	All rare in recent years
III. NONPYOGENIC INFECTIONS	Varies with incubation period	Diseases having a longer or shorter incubation period before appearance of symptoms; mostly very rare today
Tetanus	Early (days to weeks)	Only 1 case
Chancroid	Early (days)	Only 1 case
Vaccinia	Early (days)	Only 1 case
Molluscum contagiosum	Late (weeks to months)	Very rare
Serum hepatitis	Late (weeks to months)	Probably not rare even today
Tuberculosis cutis	Late (months to years)	Rare in recent years
Leprosy	Late (years)	Rare
Syphilis	Early or late	Time of onset of symptoms depends on whether an inoculation chancre (days to weeks), secondary syphilids (weeks to months), or gummas (years) are the presenting lesions

Table 1. ***Medical complications of tattooing*—Continued**

Etiologic or pathogenic factors	*Time of onset of symptoms*	*Remarks*
IV. CUTANEOUS DISEASES LOCALIZING IN TATTOOS	Variable	Actual cause of most of these diseases is unknown; recurrences may localize in tattoos more than once; may be related to Koebner's phenomenon
Psoriasis		Uncommon
Lichen planus		Uncommon
Chronic discoid lupus erythematosus		Rare: L.E. in cinnabar areas of tattoos may be related to light-sensitizing properties of mercury
Verruca vulgaris		Infrequent; a few cases may be due to primary inoculation of the virus, not to Koebner's phenomenon
Lesions of secondary syphilis		Uncommon
Herpes zoster		Only 1 case
Darier's disease		Only 1 case
V. ALLERGY	Early to very late (days to decades)	May be apparently spontaneous, or follow other exposures to the allergen
Acquired specific sensitivity to:		
Mercury		Quite common in varying degrees
Chromium		Only 2 cases reported
VI. MISCELLANY	Generally late (months to years)	Mostly exceedingly rare; precise diagnosis and relationship to tattoo often uncertain
Keloids		Rare in Caucasians
Sarcoids		Rare
Papillomas		Rare
Granulomas		Rare
X-ray opacities		Frequency unknown; possibly common but mistaken for lesions of diseases seen in soft-tissue films
Malignant neoplasm		Only 1 case
Arteriovenous aneurysm		Only 1 case

Table 1. ***Medical complications of tattooing*—Continued**

Etiologic or pathogenic factors	*Time of onset of symptoms*	*Remarks*
VII. PSYCHOPATHY	Early or late	
As a cause of tattooing		Presence of tattoos does not indicate psychiatric aberration, but nature of designs may be significant in some cases
As a result of tattooing		Unwanted tattoos may be a source of excessive feelings of frustration, guilt, and shame, and may become an emotional burden

moderate amount of serous or serosanguineous crusting, scarcely more inflammation than one would expect from an accidental abrasion, and occasionally a few, scattered, superficial pustules on and about the tattoo site. Lymphadenitis, if present, is usually mild and transitory. All this disappears in a few days to a few weeks, leaving a skin that is essentially normal in appearance except for the artificial new colors.

Pyogenic Infection

The most likely complication of the injury is secondary infection by pyogenic organisms. Serious instances of this are remarkably uncommon when one considers the less-than-operating-room standards of antisepsis under which many "tattoo artists" work. A few cases of severe, acute bacterial infection such as erysipelas,[19] gangrene,[20] and septicemia [20] have been recorded in the distant past, but failure to clean the skin site adequately, the use of dirty needles or contaminated pigments, and the nearly total lack of after-care seem to cause no more significant pyogenic infection than occurs in modern dispensaries and private offices from standard injection procedures. The skin has considerable natural resistance to infection by pyogenic bacteria, and it has even been suggested that the normal inflammatory response of the skin to acupuncture and introduction of a foreign substance may actually enhance this resistance.[13] However, increased awareness on the tattooer's part of the importance of cleanliness and stricter governmental control have probably been more important in rendering the incidence of such infections negligible.

Nonpyogenic Infections

Days or weeks after tattooing, complications arising from the accidental inoculation of nonpyogenic infectious disease organisms may appear. Disease may develop at the site of infection, or throughout the body, or both. Syphilis was apparently the first disease noted (in 1853) to be transmitted in this manner,[21] and in the last century it was one of the more commonly reported serious sequelae of tattooing. Transfer of this disease occurred when a tattooer with luetic mucous patches in the mouth used his saliva to moisten needles or pigments, or applied saliva to the skin to "clean" it or to aid healing of a fresh tattoo. The result was that he literally "tattooed spirochetes directly into the skin."[22] An uncommon clinical picture of large numbers of hunterian chancres in the same patient [23,24] was an understandable consequence in such an event. Several reports of mass inoculations by infectious syphilitic tattooers are found in the literature,[25,26] one busy operator even managing to infect 9 customers in a single day.[27] Unequivocal instances of the transmission of syphilis by tattooing have been reported only rarely since the early years of this century, but as late as 1935 Hamada [28] found the incidence (20 percent) of positive Wasserman reactions in a group of 265 tattooed Japanese iron workers to be significantly higher than among similar workers who were not tattooed.

A similar mode of transmission has been implicated in the less common infection with human tubercle bacilli after needling through pigment mixed with saliva [29,30] or after rubbing the fresh tattoo with milk infected with bovine tubercle bacilli;[31] the disease usually manifested itself in these patients as tuberculosis verrucosa cutis. Rare cases of tetanus,[22] chancroid,[32] molluscum contagiosum (a viral disease), and acne varioliformis (possibly a tuberculid, or an unusual pyoderma),[33] and what apparently was leprosy [34] following tattooing are mentioned in the literature. Wilde [35] observed a patient whose recent tattoo was destroyed by severe vaccinia spreading from an adjacent vaccination for smallpox. It was suggested that the virus of infectious hepatitis could be transmitted by the tattooer's needles, and recently several cases of this disease have been shown to have been almost certainly acquired in this fashion.[7,36]

The interval between tattooing and the appearance of symptoms among diseases of this group varies with the time required for a sufficient number of organisms, or their toxic products, to be produced (tetanus), or for the development of an immunobiologic transformation on the part of the host to the invading organism (syphilis, tuberculosis, leprosy). It may be a matter of weeks, months, or years before

clinical signs are noticed, by which time a tattoo as a portal of entry for a systemic disease may have been forgotten. One could guess, for example, that the long incubation period of infectious hepatitis obscures the possibility that tattooing may be a not uncommon method of acquiring this disease.

Cutaneous Diseases Localizing in Tattoos

Conditions of this category generally appear late. Except for the rare localization of late syphilitic cutaneous lesions in tattoos,[37] and excluding late manifestations of diseases such as tuberculosis and leprosy, the cutaneous manifestations and the remaining complications of tattooing comprise a mixed group of diseases, none of which is definitely known to be caused by an infectious agent. The cutaneous category consists of those skin diseases (psoriasis, lichen planus, and others) that tend to localize in areas subjected to trauma (Koebner's phenomenon). In such cases a linear formation of new lesions may suddenly appear in a scratch mark, or a plaque in an area of pressure. Even infectious diseases show something of this characteristic; for example, the predilection of cutaneous lesions of secondary syphilis for areas of minor trauma, as seen in corona veneris (lesions localizing on the brow among Moslems who traumatize the forehead when pressing it against the ground in prayer).[38] Presumably the Koebner phenomenon represents decreased resistance of the skin because of injury. The term *locus minoris resistentiae* (area of decreased resistance), applied to such sites in general, was originally used by Lipschütz [39] to describe the peculiar behavior of secondary syphilids that sometimes become more pronounced in tattoos. Since tattoos have been shown to alter the response of otherwise normal skin to mechanical stimuli,[40,41] a tattoo may act as a form of mild, continuing irritation.

Among skin diseases whose occurrence in tattoos has been ascribed to the Koebner phenomenon are psoriasis,[42] lichen planus,[11] chronic discoid lupus erythematosus,[17,18] verruca vulgaris,[43] and lesions of secondary syphilis.[39, 18] Schönfeld [11] considered that certain previously reported cases of tattoos associated with Boeck's sarcoid, leprosy, tuberculosis cutis, herpes zoster, and keloids were also manifestations of this nonspecific phenomenon. Precise categorization is often difficult; for example, common warts arising in tattoos may be the result either of the Koebner phenomenon or of direct inoculation of the causal virus by the tattooing needles. Even in those diseases which most often demonstrate Koebner's phenomenon, reports of cases involving tattoos are curiously infrequent.

Many reports call attention to the striking absence of secondary syphilids in red areas of tattoos.[44, 45] This does not invalidate the concept of a tattoo as an area of decreased resistance, however, because the material commonly used to produce the red color is a compound of mercury. Clinical observations suggesting that the concentration of mercury in the skin after tattooing is high enough to exert a definite antisyphilitic effect have been confirmed by animal experiments;[46] this has led to some rather ribald suggestions about putting this phenomenon to practical use in man.[47] Belote [45] pointed out that the occasional appearance of what looked like lesions of secondary syphilis in the red areas of tattoos [48, 49] occurred in cases in which the red pigment was not proved to be mercury, and Noel [50] mentions the possibility that in instances when a mercury pigment was used, the condition may have been a coincidental dermatitis caused by mercury rather than a syphiloderm.

Sensitization

A more common complication of tattooing is the development of sensitivity to injected pigments, notably mercury. In these cases the reaction is often again limited to areas spared by secondary syphilids; here the mercury exerts a baleful influence not upon spirochetes but upon the sensitized tattooed person. The pathomechanism and other facts about this occurrence are discussed more fully later in this paper.

Miscellany

Sarcoids,[18, 51] malignant neoplasms,[52] papillomas of unspecified nature,[53, 54] mercurial granulomas,[55] and keloids [56, 57] arising in tattoos have been reported. Such cases are so rare that causal relationship with the tattoo is sometimes doubtful.

One might suppose that foreign-body reactions would be a fairly common occurrence after tattooing, but this is not the case. The histopathology of both normal and complicated tattoos is not typical of a foreign-body reaction. For this reason the term foreign-body granuloma, which has sometimes been used to designate certain complications of tattooing,[58] is probably best omitted entirely, as Beerman and Lane [13] and others have suggested.

Pendergrass [59] has called attention to the fact that the portions of tattoos made with radiopaque metal salts may cause definite opacities

on roentgenograms. In his opinion these are being seen with increasing frequency, and might possibly be mistaken by the unwary radiologist for calcinosis circumscripta, or for calcification in skin tumors, lupus, and certain parasitic infestations.

Finally, a complication that deserves more notice than it seems to have received in the past is the adverse psychologic effect (feelings of guilt and shame) that sometimes displaces the original elation of being tattooed. Most surgeons and dermatologists have had the experience of being requested to remove a tattoo that has become a social hazard and a psychic burden. Sometimes passage of time or change in social status have altered the patient's ideas of propriety, and sometimes it has become clear that the addition of a name to the skin was a premature, ill-advised, and nearly ineradicable declaration of affection. Rarely, criminal intent may lie behind a patient's desire to have an identifying tattoo covered, removed, or altered. Thus, this seemingly minor hazard of being tattooed can present a grave problem in later years.

SENSITIVITY TO PIGMENTS IN TATTOOS

The requirements of a pigment suitable for tattooing are ability to produce a strong, brilliant color or a distinct shade in the skin, near insolubility in body fluids, stability to light, lack of toxicity, and low sensitizing potential. Of course, low cost and ready availability are desirable features from the viewpoint of the professional tattooer. A wide variety of materials are used, ranging from a simple element like carbon (blue to black) to inorganic compounds like chromium sesquioxide (green). Others may be naturally occurring mixtures of varying colors and uncertain composition, such as the ochres (red, yellow, or brown). A detailed list of some tattooing pigments is given by Rostenberg, Brown and Caro.[16]

Except for red, nearly all pigments commonly used by professional tattooers are so inert and of such low antigenic potential that reactions based on sensitivity to them are almost unknown. Only 2 cases of allergic reaction to a green pigment have been reported. In one case chromium was definitely identified as the allergen;[60] in the other case chromium was suspected but not proved to be the offending substance.[16] Rarely, a substance containing a primary irritant, such as shoe polish or printer's inks of the oil-based variety, may be used by amateurs unversed in the art. I have seen a case in which tattooing with black shoe polish caused severe inflammation resulting in sloughing of the involved parts (dorsa of hands). However,

sensitivity to the usual red pigment in tattoos is by far the commonest complication.

The red color may be produced by preparations of red ochre (sienna), cadmium selenide (cadmium red), madder, sandalwood, brazilwood, or carmine (an aluminum lake of cochineal), but generally red mercuric sulfide is employed. This occurs in nature as the mineral cinnabar (red amorphous mercuric sulfide), but the usual commercial preparation is red crystalline mercuric sulfide (vermilion, chinese red, artificial cinnabar). Unfortunately it also shares with other mercury compounds a relatively high sensitizing potential.

CLINICAL FEATURES OF MERCURIAL DERMATITIS IN TATTOOS

The signs and symptoms of dermatitis in tattoos caused by sensitivity to mercury may be present from the time the design was applied, or may appear years later. The dermatitis may start in an apparently normal tattoo following local or distant exposure to exogenous mercury, such as the use of a mercurial ointment or mercurial diuretics; in these cases the eruption may subside when the source of exposure is withdrawn. In many instances the dermatitis seems to occur spontaneously; in these the symptoms usually persist without change unless treatment is undertaken, although Sulzberger, Kanof and Baer [18] have recorded an unusual case in which both the dermatitis and sensitivity to mercurial patch tests subsided without treatment.

Clinical manifestations of dermatitis due to mercury in tattoos vary from mild local edema to severe eczematous or exfoliative processes that may involve large areas of skin or occasionally result in the formation of granulomas or tumors. Probably the commonest signs are mild to moderate edema confined to the red area of the design; some inflammation (which is difficult to evaluate because of the red pigment); and intermittent vesiculation, crusting, and scaling just sufficient to suggest that the condition may be fundamentally eczematous. Often when a normal-appearing tattoo is viewed by oblique illumination, the red areas are seen to be elevated and have a waxy, translucent appearance. These elevated areas are sometimes best found by very light palpation.

The onset is usually mild and gradual, with involvement confined to the red or immediately adjacent areas of the tattoo, but it may be acute and fulminating, with severe local and systemic signs of mercury toxicity.[61] The chief symptom in all but the most severe cases is itching, which is usually mild and intermittent but may become constant and

so severe as to be intolerable to the patient. Chronic generalized dermatitis may develop.[62]

CASE REPORTS

CASE 1. A 19-year-old white Navy enlisted man complained of intense pruritus in the red area of a small tattoo on his right arm. Itching had been present since the tattoo was performed about 6 months before. He had been treated with calamine lotion topically at another dispensary with little relief. He stated that in recent weeks the itching had become increasingly severe, even occasionally interfering with sleep. He had noticed that small "blisters" sometimes appeared when the itching was most severe.

Figure 1 (case 1). Edema and crusting in a tattoo, sharply limited to the center of the star after the name and the center of the flourish beneath it. These areas were colored with red pigment.

Examination revealed a tattoo on the outer aspect of his right arm consisting of the word "Will" in cursive script, with a small star after it and a broad flourish under it. The design was done in blue except for the centers of the flourish and star, which were red (fig. 1). The red areas showed edema and a few crusted papules; the rest of the tattoo was normal. There was no palpable axillary

lymphadenitis. A patch test with 2 percent ammoniated mercury in petrolatum was strongly positive at 24 hours, with mild vesiculation and much pruritus at the test site (upper back); there was no increase of itching or flare-up of lesions in the tattoo.

The affected areas were surgically excised under local procaine infiltration anesthesia. Healing was uneventful and relief from symptoms complete. A pathologic examination of the excised tissue showed only chronic dermatitis.

Figure 2 (case 2). Edema and scaling in a tattoo, sharply limited to the collar and nose of the dog and parts of the underlying letters, which were colored with red pigment.

CASE 2. A 21-year-old white Marine Corps enlisted man complained of a scaly eruption with moderate itching in the red areas of a tattoo. He had been tattooed about 18 months previously, but the symptoms had appeared only 2 months before he was seen. The degree of eruption and the severity of itching varied somewhat during that time but had never disappeared completely.

Examination revealed a large tattooed caricature of the head of a bulldog wearing a Marine Corps hat, with the letters "U.S.M.C." underneath it (fig. 2).

Most of the design was blue-black, with a portion of the lettering, the collar, and the nose of the dog done in red. Only the red areas were abnormal in appearance; they were slightly raised, edematous, and somewhat translucent. A small amount of loosely adherent white scale was present in some of the affected areas. There was no palpable axillary lymphadenitis. A patch test with 2 percent ammoniated mercury in petrolatum applied to the patient's upper back was positive at 24 hours. Although there was no vesiculation or other sign of severe reaction at the site of the patch test, the reaction persisted for several days and coincided with an increase in pruritus at the site of red pigment in the tattoo, but without change in its appearance.

Surgical excision of all the affected areas was advised but declined by the patient because it would mutilate the design. Topical applications of calamine lotion and Pyribenzamine (tripelennamine) hydrochloride 50 mg twice daily by mouth as needed were prescribed with some relief of itching. When seen 4 months later, the patient professed satisfaction with the results, although the appearance of the lesions was unchanged.

DISCUSSION

The cases presented here are not especially remarkable but they serve to emphasize certain points of interest. In neither case was there any history of previous sensitivity to mercury, and no recent exposure to this element in the form of medications or occupation could be demonstrated. Although the offending substance in the red areas of the tattoos was not conclusively proved to be mercury, as it has been in some cases, [55, 60] the site and nature of the dermatitis, its clinical course, the positive patch tests, and the known frequency of this condition incriminate mercury.

In case 1, as in a few others,[12, 18] symptoms appeared almost immediately after tattooing. Because the period of itching and discomfort from the healing of tattoo inflammation overlaps the 5- to 7-day minimum incubation period for mercury sensitization, a patient may be unable to distinguish between the two reactions in mild cases. Thus it may be impossible in a given case to determine whether the cinnabar acted as the sensitizing exposure to mercury, as the eliciting dose, or as both. Previous sensitization was clearly implicated when severe dermatitis suddenly developed in the red areas of a tattoo performed 36 hours before in a patient previously tattooed without difficulty.[61]

In case 2 there was an interval of about 16 months between tattooing and the onset of symptoms. Such a sympton-free period is often found in the literature, ranging from 3½ months [18] to many years; in a case recorded by Unna[63] there was no flare-up in the tattoo for at least 20 years, and the interval was probably a great deal longer (his patient was a 63-year-old man who was tattooed "in his youth").

Why there should be a long period of time before the appearance of signs of sensitization is, in most instances, not clear; such factors as amount of exposure to the antigen (concentration and availability), duration of exposure, and the patient's ability to become sensitized are important. In some cases the flare-up after a relatively long interval of freedom has been clearly shown to be due to sources of mercury other than cinnabar. Among such proved or postulated sources are compresses of mercurial solutions, mercurial ointments, calomel for laxative purposes or for venereal disease prophylaxis, mercurial diuretics, and amalgam in dental fillings. Even patients with no obvious exposure to mercury other than cinnabar may still have unknowingly come into contact with minute amounts of the element, enough to initiate and maintain an allergic reaction at the cinnabar depot in the tattoo. The fact that infinitesimally small quantities of mercury can do this is shown in the remarkable case observed by Sulzberger and Tolmach,[64] in which the mercury contained in 0.1 ml of Asian influenza virus vaccine (equivalent to 0.004955 mg of mercury) given intradermally initiated a dermatitis in the tattoo, which had been present for 8 years without symptoms. If there is truly no exogenous source of mercury associated with late mercurial dermatitis in a tattoo, sensitization must be the result of the presence of cinnabar and an interplay of the factors mentioned before.

Very little is known about the mechanism by which mercury in a cinnabar tattoo acts as an antigen. Cinnabar is insoluble in water and a rather stable compound under conditions of normal body temperature and tissue pH, but there must be a certain degree of solubility in tissue fluids in order to produce reactions. I have found only 7 reported cases of cinnabar dermatitis in tattoos in which patch testing was done with cinnabar (as the pure powder, or as a 2- or 3-percent ointment) as well as with other mercurial compounds. Of these 7 cases, 4 were positive [12, 61, 65, 66] and three were negative [18, 51, 64] to cinnabar but all were positive to the more soluble or more highly dissociated mercurials. This tends to support the conclusion of Blumenthal and Jaffé [67] that sensitivity to mercury as determined by patch testing depends on relative solubility more than on the complexity of the compounds used. In this regard, it is possible that red mercuric sulfide is physically and chemically not the best material for a mercurial patch test; but it has also been suggested that sensitization may be caused by a derivative of mercury formed in the tissues.[68] After tattooing, most of the particles of cinnabar are extracellular; but some are intracellular, and according to McKenna,[69] these may undergo dissociation, form organic compounds, and then act as haptenes. In the case of their patient who became sensitized

following administration of Asian influenza vaccine, Sulzberger and Tolmach [64] postulate that sensitization to mercury was facilitated by the presence of protein in the vaccine, and perhaps by the fact that injection was intradermal.

There is some clinical evidence that not all of the mercury in a tattoo is available at one time to act as an antigen. Keiller and Warin [66] observed a patient with a very severe mercurial dermatitis arising from a tattoo. While awaiting definitive treatment by surgical excision of the tattoo, administration of dimercaprol (BAL) by injection caused the dermatitis to subside and remain quiescent for 7 to 10 days on each of several occasions. This might represent the time required for more mercury to be released from the pigment granules after the peripheral portions had been bound by the drug. On the other hand, it might simply indicate that some dimercaprol remained in the body for this length of time after each course of injections.

TREATMENT

The treatment of the complications of tattooing includes specific antibacterial agents for bacterial infections and any measures effective against systemic diseases localizing in tattoos. In addition, one must consider whether the tattoo *per se* requires treatment. Clearly, any of the infectious diseases associated with tattooing could proceed equally well from an ordinary accidental abrasion or puncture wound. In some degree this is probably true also of the diseases of unknown etiology listed in table 1, but the actual presence of a tattoo is essential in those sequelae caused by sensitization to the injected pigment. Where actual removal of a tattoo is necessary, the most suitable method for a given case may depend not only upon the reason for undertaking treatment but also upon the size and location of the design. For example, total excision of a very large tattoo in an area where the skin cannot easily be mobilized would be impractical without extensive use of skin grafts. If obliteration or concealment of the tattoo is desired for cosmetic reasons alone, tattooing over the design with skin-colored pigment often suffices; this is the common practice of professional tattooers.

Among the lay population there seems to be no end to the methods and materials that have been advocated at one time or another for the removal of tattoos. Most of them seem to involve the application, under propitious circumstances, of substances that are repulsive, or very hard to obtain, or both. Unlike warts, tattoos do not respond to psychotherapy, but before dismissing such practices as pure superstition one should recall that Klövekorn [70] found that repeated

rubbing of a tattoo with coarse salt over a period of many months actually did give good results. Self application of strong caustics is also effective; I recently saw a patient who had successfully removed a tattoo on his forearm some years before simply by pouring concentrated sulfuric acid over it, at what cost in pain may only be imagined.

Shie [22] reviewed the problem of removing tattoos at some length, and Cattani [8] discussed various methods in great detail. All these methods are based essentially upon some form of surgical removal of the design, or upon causing a controlled amount of sloughing that carries pigment off with the affected skin. All of them leave some scarring.

The particles of pigment may simply be dug out of the skin with fine needles under local anesthesia,[8] or they may be picked or curetted from the undersurfaces of incised flaps of skin.[71] Such methods are tedious and difficult. Dermabrasion, or planing of the skin by means of high speed rotary brushes or burrs, has been advocated for the removal of tattoos.[72] Removal of all pigment from very small tattoos is probably satisfactory, but would result in considerable scarring of large ones. Sandpapering the skin, an older form of dermabrasion that has been used for this purpose, has similar objectionable features and may, in addition, give rise to granulomatous lesions from small particles of silica left behind. Total excision of tattoos, where feasible, usually gives better results than other surgical procedures.

Among the methods that have been used to produce tissue destruction with sloughing are application of solid carbon dioxide, strong ultraviolet irradiation (Finsen lamp), electrolysis, cautery, electrodesiccation, and a variety of irritants and chemocaustics (cantharides, pyrogallol, calcium sulfide, zinc chloride, oxalic acid, phenol) which may be used alone or with superficial scarification. These methods may be unsatisfactory, for the amount of control one has over the depth of tissue involved is problematic. One procedure of this sort that continues in favor, with slight modifications, was introduced by Variot [73] in 1888. He covered the tattoo with a concentrated aqueous solution of tannic acid and then firmly rubbed the area with solid silver nitrate. Finally, the treated site was dusted with powdered tannic acid and bandaged. The eschar that was produced fell off in 2 or 3 weeks, taking with it most of the tattooed pigment.

The treatment of mercurial dermatitis occurring in tattoos is a special case. Here the object of therapy is to prevent further interaction of the antigenic substance with whatever antibody system is responsible for the clinical manifestations. The simplest way to achieve this is to remove the mercury-bearing tissue, but the methods

suitable for doing this are restricted by the need to remove all of the mercury present, since a very small amount of the element left behind might suffice to continue the symptoms. The method of choice at the present time is surgical excision. One can be fairly certain that all pigment has been removed if a sufficiently wide and deep section of skin and subcutaneous tissue is excised. Clean incision, undermining of wound edges, careful approximation of wound margins with many fine sutures, and the use of stay sutures as required—in short, close adherence to good surgical technic—usually results in a clean, hairline scar. Where the skin is suitably slack, even very large tattoos may be removed in this manner by repeated serial excisions over a period of months; in the hands of a skilled surgeon the result is often cosmetically excellent. If the skin of the affected area cannot be easily mobilized, Thiersch grafts may be used after partial excision of the tattoo, and the process repeated after healing has taken place.

Finally, it would seem that prevention of complications by some measure of discouragement of tattooing is desirable. The psychology of tattooing has been reviewed elsewhere,[1, 8, 74, 75] and in any event is beyond the scope of this paper. Whatever the psychiatric implications may be, an element of consent is usually present. Although tattooing is not officially encouraged by the military services, medical officers might do well to emphasize the dangers that can beset the practice. At least it should be emphasized early in the serviceman's career that being tattooed is a nearly irrevocable step, and that if he changes his mind about it afterward the best alternative is camouflage with more pigment or the substitution of a scar.

SUMMARY

The fairly common practice of decorative tattooing has sequelae of medical importance. A brief review of the nature and frequency of complications of tattooing is presented. Improved standards of hygiene have made serious complications uncommon, with the possible exception of infectious hepatitis, but milder ones are not rare.

Allergic dermatitis caused by cinnabar, a red pigment containing mercury, is probably the commonest of present-day complications. Its clinical features are described and 2 cases are reported. Of the many forms of treatment that have been used to alter or remove tattoos, the method of choice for mercurial dermatitis in tattoos at present is surgical excision.

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Cockroach Control Aboard Navy Surface Ships

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THERE WAS A TIME when sailors wore gloves to protect their fingernails from being gnawed by the hordes of cockroaches that infested ships.[1] Although this is no longer necessary, the problem of roaches aboard ship continues to remain acute. The problem is unique. In no other situation are the sanitation procedures quite the same; nowhere else is galley construction completely dominated by space conservation principles; nowhere ashore are untrained personnel expected to control a problem of this magnitude. All this is complicated by the cockroach, which has developed a high degree of resistance to currently used insecticides.

The purpose of this report is to outline some of the factors that affect the control of the cockroach problem and to submit recommendations pertaining to technics of sanitation and chemical control, basic ship design, and cockroach resistance to insecticides. This report is intended to present some possible solutions to these problems and serve as a basis for additional study in this neglected area of insect control.

During a 9-month survey (June 1958 through February 1959), 145 ships of 31 types (table 1) were thoroughly inspected for cockroach infestations and conditions supporting extensive cockroach development. All ships used in this study were selected by random-sampling methods. Each week ships were chosen from the "ships present list" in alphabetic order and a letter requesting permission to visit the ship was sent. Inasmuch as the daily ships present list normally

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Table 1. ***Distribution of ships visited according to type***

Type	*Number*
Destroyer tender	4
Store ship	2
Icebreaker	1
Amphibious force flagship	2
Radar picket ship	2
Attack cargo ship	6
Oiler	3
Attack transport	11
High-speed transport	2
Repair ship	1
Salvage ship	1
Submarine tender	2
Submarine rescue vessel	2
Auxiliary ocean tug	2
Fleet ocean tug	6
Seaplane tender	1
Small seaplane tender	1
Heavy cruiser	2
Coast Guard cutter	1
Attack aircraft carrier	3
ASW support aircraft carrier	1
Destroyer	44
Radar picket destroyer	4
Escort vessel	9
Inshore fire support ship	1
Dock landing ship	11
Tank landing ship	10
Minesweeper, coastal nonmagnetic	1
Minesweeper, ocean nonmagnetic	6
Rescue escort	2
Drone aircraft catapult control craft	1

includes between 60 and 100 ships, a complete sampling of the ship population in the San Diego area was obtained.

Despite the fact that 4 species of cockroaches (German, American, brown-banded, and Oriental) have been domesticated and are commonly found in man's environment, only 1 species, the German cockroach *Blattella germanica*, is found aboard ship. On one occasion, the hold of an attack transport was found to be slightly infested with American cockroaches (*Periplaneta americana*), but the authors consider this to be uncommon. Throughout the remainder of this report, all references to cockroaches will be to the German species.

EXTENT OF COCKROACH INFESTATION ABOARD SHIP

Of the 145 randomly selected ships, only 44 (31 percent) were found to be entirely free of cockroaches at the time of inspection. The remaining 101 ships (69 percent) were found to have at least some degree of cockroach infestation.

When making inspections of ships, each compartment in which food was prepared or stored was thoroughly inspected for signs of infestation and the actual presence of cockroaches. Personnel who normally worked in the compartment were questioned as to the presence of cockroaches during the preceding weeks. If no cockroaches were found or reported, the compartment was given a cockroach index of 1.0. If 1 to 5 cockroaches were seen, the infestation was considered slight, and a cockroach index of 2.0 was given. Infestation was considered moderate if 6 to 20 cockroaches were found, and a cockroach index of 3.0 was assigned. The presence of more than 20 cockroaches in a compartment was considered a heavy infestation, with an index of 4.0. Cockroach indexes for each compartment on a ship were averaged in order to obtain a total index. The average total cockroach index for all ships visited, including those entirely free of cockroaches, was found to be 1.6, or a "very slight" cockroach population. Four ships, however, were found to have a total cockroach index greater than 3.0, or a "moderate to heavy" infestation, in all food service compartments. A total of 197 compartments visited had a cockroach index of 3.0 or more.

THE ROLE OF SANITATION

Speaking of cockroach control, Hopkins and Elder [2] stated: "The best control is scrupulous cleanliness, disposal of waste scraps and storage of food in tight containers." This statement not only applies to cockroach-control procedures ashore but especially to the unique conditions found aboard ship.

As in the case of the cockroach index, a sanitation index was assigned to each food-service compartment on a ship. An average of all compartments established the total sanitation index for the ship. If a compartment had excellent sanitation, a value of 4.0 was assigned; good sanitation, 3.0; average sanitation, 2.0; and poor sanitation, 1.0. Occasionally an inspector would find a compartment with average to good sanitation, and a value of 2.5 was assigned. By plotting the distribution of ships according to total sanitation index

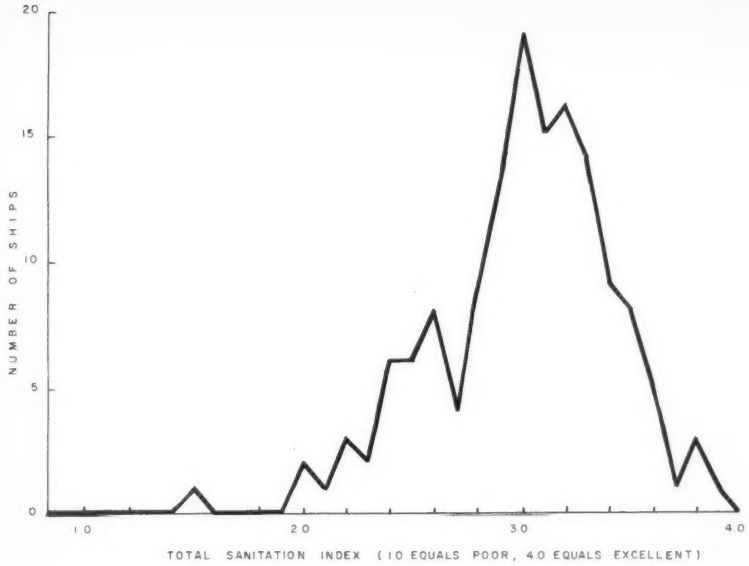

Figure 1. Distribution of ships according to total sanitation index.

(fig. 1), we find a negatively skewed, bell-shaped distribution, with the average total sanitation index being 3.0 or good.

The effect of sanitation on the total cockroach index is striking. This relationship is shown by plotting the average total cockroach index against the total sanitation index (fig. 2). Only points having 4 or more ships are plotted in order to obtain an accurate picture. This curve definitely shows that as the total sanitation index increases, the total cockroach index decreases. It should be kept in mind that this curve does not take into account the size of ships, the use of insecticides, insecticide resistance, or any other factors that might affect the cockroach population.

SANITATION TECHNICS

As indicated in the preceding section, sanitation is one of the most important factors in the control of shipboard infestations. Theoretically, the sanitation technics established for ships of the U.S. Navy are most acceptable and, if properly followed, would do much to eliminate the extreme cockroach problem that now exists. Sanitation depends more on personnel than does any other phase of cockroach control, and sanitation becomes poor through improper indoctrination

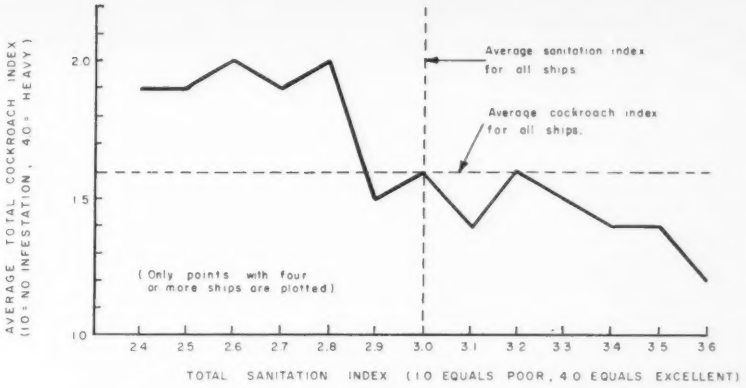

Figure 2. The effect of sanitation on the cockroach index.

or sheer laziness. No further recommendations can be made concerning alterations or modifications of the present sanitation technics because, if properly followed, they would result in excellent over-all sanitation. Some of the outstanding sanitation discrepancies found aboard ships are enumerated here, however, in order that more emphasis can be placed on their correction.

1. The most frequently found discrepancy is the improper or inadequate removal of food particles from decks, bulkheads, and working surfaces. When visiting ships, it was common to see several days' accumulation of food on the deck under ranges or reefers. Many ships do not clean down thoroughly after each meal and some are cleaned as infrequently as once a day.

2. The improper use of waste disposal (GI) cans was the second most frequently found sanitation discrepancy. In 431 compartments of the 145 ships visited, GI cans were not on hand, were not used, or were not equipped with properly fitting lids. This resulted in garbage being available to the cockroaches throughout the day and, in some instances, even during the night.

3. Open packages of food left lying about on shelves are obvious feeding sources for the cockroach. In 345 compartments such items as crackers, condiments, sugar, and bread were found on shelves or in dark cabinets waiting to serve as food for the cockroach. Food sources such as these remain available on a 24-hour basis and can be found in otherwise spotless compartments.

4. Damp and dirty swabs were found on the deck in 160 food service compartments. These swabs remain in the compartment overnight and can furnish both moisture and food to a large cockroach population.

5. Food preparation equipment was frequently found in an unsanitary condition. Toasters, dishwashers, and meat cutting boards contained enough food to support a large cockroach population. Other practices, such as thawing meat overnight at room temperature in the galley area, placing kraft paper on shelves and in drawers, and using broken bread boxes, all contributed to the list of poor sanitation practices.

6. Although not contributing to cockroach development, another poor sanitation practice was the storage of insecticides and insecticide dispersal equipment in the galley area. This practice was found to exist on 18 of the 145 ships visited.

In conclusion, it is recommended that an attempt be made to improve the over-all sanitation standards aboard ship, by emphasizing the importance of sanitation in the control of cockroaches. It is believed that hospital corpsmen, supply department personnel, and Medical Corps and Supply Corps officers should receive a thorough indoctrination at Navy service schools in the procedures and importance of good sanitation in food-service areas aboard ship. Detailed instruction also should be given on the proper technic of conducting a sanitation inspection and on the effectiveness of unannounced inspections.

THE ROLE OF SHIP DESIGN

The role of basic ship design in the cockroach problem is a most important consideration and is very closely linked to cleaning and sanitation technics. Naturally, there are factors in ship design which would be impractical, if not impossible, to correct. Some of these incorrigible situations include the maze of overhead wiring, which serves as an ideal cockroach hiding place in infested areas; the close proximity of galleys and messing areas to berthing compartments and lavatories; the cramped quarters and lack of suitable storage space in galleys and messing areas; and the continuous water supply which is available to cockroaches in the galleys and messing areas.

The most outstanding flaws in ship design encountered in this study were false bulkheads and stainless steel shieldings in food-service compartments. In 258 food-service compartments, cockroaches were found hiding and feeding in dead spaces behind false bulkheads and behind the steel shielding that is installed to streamline food-service compartments. If properly installed, these stainless steel shields and false bulkheads would present no problem; however, because of large cracks and holes at seams and riveted areas, not only do cockroaches find refuge in these areas, but food and grease also accumulate in areas impossible to clean.

Cracked and loose insulation and pipe lagging were found in 223 food-service compartments. Large cracks in old insulation and loose lagging provide innumerable cockroach harborages that are most difficult to treat chemically. In 123 compartments, ranges, reefers, storage cabinets, and other galley equipment were too close to the deck to allow proper cleaning. Food particles accumulating under

this equipment can be removed only with great difficulty and, as a result, these areas are cleaned infrequently.

False bottoms in cabinets and beneath equipment represent another shortcoming encountered in food-service compartments. Again, food accumulates in areas impossible to clean.

On many occasions grease filters in overhead exhaust fans are difficult to remove. This results in infrequent cleaning and a heavy accumulation of grease. Cockroaches in large numbers have been observed feeding on dirty grease filters. Other outstanding faults in ship design include poor deck drainage in the galley area, galley equipment not close enough to bulkhead (thereby allowing food particles to fall behind the equipment), and potato storage facilities located in the galley area.

Recommendations concerning the correction of outstanding faults in ship design are:

1. Specifications concerning the correct installation and proper calking of all false bulkheads, stainless steel bulkheads, and shields should be established. If this is impractical, it is recommended that installation of these fixtures be prohibited.
2. Within reasonable limits, all old, cracked, and loose insulation and lagging should be replaced in a manner that will avoid a repetition of this situation.
3. All galley equipment should be raised as necessary to allow a clearance of 10 to 12 inches between the deck and the bottom of equipment. In most cases there is sufficient space between the top of the equipment and the overhead to allow for elevation. New ships should be designed to permit easy access to all areas that will require cleaning.
4. False bottoms in cabinets and beneath equipment should be removed, and future installations should be redesigned so as to avoid dead spaces of this type.
5. A grease filter that can be easily removed should be standardized for all overhead exhaust fans in food service areas.
6. Specifications should be established concerning the proper installation and calking of all galley equipment, particularly ranges. This will help prevent food accumulations behind equipment in inaccessible areas.

RESISTANCE TO INSECTICIDES

In 1956, DuChanois [3] reported: "To date no clear-cut examples of resistant naval shipboard strains have been encountered or brought to our attention." Since that time the cockroach resistance picture has almost done an about-face. Perhaps in another year we shall say: "No clear-cut examples of susceptible naval shipboard strains have been encountered."

When ships were inspected an attempt was made to collect a suitable cockroach colony for insecticide-resistance testing. In many ships, however, where infestation was slight and only 2 or 3 cock-

roaches were seen during the entire visit, no cockroach sample was collected. Thus, all colonies tested represent ships that had at least 1 compartment with moderate to heavy infestation. All tests were conducted in accordance with the Armed Forces Pest Control Board's Technical Information Memorandum No. 3.[4] Tests showed that 45 (73.7 percent) of the colonies from 61 ships were chlordane resistant; 36 (75.0 percent) of 48 colonies were dieldrin resistant; and 28 (63.6 percent) of 44 colonies were lindane resistant. In comparison, none of the 40 colonies tested for malathion resistance proved to be resistant. These results indicate that cockroach resistance has effectively eliminated the further use of chlorinated hydrocarbon insecticides. It is most interesting to note that only 5 ships were using dieldrin and only 3 were using lindane; however, resistance to all chlorinated hydrocarbons tested was extensive.

EXISTING COCKROACH CONTROL TECHNICS

Present cockroach-control technics applied aboard ships are far from adequate. As indicated in the previous sections, there is great need for improvement in sanitation and ship design. The problem of chemical control is equally acute. Table 2 is a compilation of the insecticide used at the time of inspection, the equipment used to apply the insecticide, the frequency of application, the personnel employed in the application of insecticide, and the personnel who have attended the 1-day course in shipboard pest control.

Despite the fact that 73.7 percent of the ships tested had chlordane-resistant cockroach populations aboard, only 2 ships (1.3 percent) were using organic phosphate insecticides (malathion and dimethyl 2,2-dichlorovinyl phosphate) to control the problem, and the latter was not recommended by an entomologist. Sixty-one ships (42.3 percent) were applying insecticide more frequently than once every 2 weeks (a situation which should never be necessary). At the time of the visit, only 44 ships (30.3 percent) had personnel aboard who had received any training in shipboard pest control.

RECOMMENDED CONTROL TECHNICS

It is recommended that a radical change from the policy of allowing ships to perform their own cockroach control be adopted. Experience gained in the application of test insecticides to various ships has indicated that by establishing shipboard pest control units, the control

Table 2. ***Cockroach control aboard 145 ships***

Factors	*Ships*	
	Number	*Percent*
INSECTICIDE USED		
2,2-bis-(*p*-chlorophenyl)-1,1,1-trichloroethane (DDT) 5 percent	4	2. 7
Chlordane, 2 percent solution	111	75. 8
Aerosol bomb	17	11. 7
Chlordane and DDT (combined or alternating)	7	4. 8
Boric acid (tablets and powder)	7	4. 8
DDT dust, 10 percent solution	9	6. 2
Lindane, 1 percent solution	3	2. 0
Dieldrin, 0.5 percent solution	5	3. 4
Malathion, 3 percent solution	1	0. 6
Chlordane dust, 5 percent	1	0. 6
Dimethyl 2,2-dichlorovinyl phosphate (DDVP)	1	0. 6
Vaposector	2	1. 3
EQUIPMENT USED		
2-gallon sprayer	16	11. 0
3-quart sprayer	52	35. 8
Hand oiler	71	48. 9
Paint brush	36	24. 8
1-quart sprayer	29	20. 0
Electric sprayer	28	19. 3
Hypodermic syringe	10	6. 9
FREQUENCY OF APPLICATION		
Three times a week	18	12. 4
Twice a week	11	7. 9
Once a week	32	22. 0
Every 2 weeks	10	6. 9
Every 3 weeks	3	2. 0
Once a month	23	15. 9
As necessary	48	33. 1
PERSONNEL EMPLOYED		
Medical department only	63	43. 4
Supply department only	40	27. 5
Medical and supply departments	42	29. 0
ATTENDANCE AT PEST CONTROL COURSE		
Yes	44	30. 3
No	101	69. 7

of cockroaches would be obtained with greater efficiency, economy, and safety.

Shipboard pest control units located in the major ports (on the west coast, San Diego, Long Beach, San Francisco, and Pearl Harbor) could successfully schedule and treat infested ships on an exchange-of-funds basis. When requested by the commanding officer, representatives from the pest control units would inspect the ship, make recommendations concerning sanitation and corrections in ship design, and establish a date for spray operations. On the date of the spray operation the pest control unit would supply insecticides, application equipment, protective equipment, and competent supervision. Ships would supply personnel to apply the insecticide.

Centrally located shipboard pest control units would eliminate the expense incurred when each ship carries its own insecticides and insecticide application equipment. Each unit could be prepared to conduct insecticide-resistance tests and thereby the proper insecticide could be used for each population. Burden, Lofgren and Eastin [5] report: "The development of malathion resistance in the laboratory colony indicated that resistance to this and other organophosphorous insecticides is likely to develop in field strains of German cockroaches." In view of this statement, it is believed that highly trained personnel should be employed in the application of control methods aboard ship if satisfactory control is to be expected. The problem of shipboard cockroach control has become too complex to expect satisfactory control from untrained shipboard personnel who apply insecticides only as a minor part-time duty. It is reasonable to expect that in the future insecticides that are more toxic to humans will be used in the control of cockroaches. Personnel of the shipboard pest control units would be fully trained in the safe use of these materials. The possibility of poisoning in human beings would therefore be much less than if untrained or semitrained shipboard personnel were to apply the material. Operational details of a shipboard pest control unit could be resolved by the establishment of a pilot facility. It is estimated that 6 men could successfully handle all shipboard insect and rodent problems in a port the size of the San Diego area.

ORGANIC PHOSPHATE INSECTICIDES

In order to evaluate substitute chemicals for control of chlordane-resistant populations, field tests were conducted with the following organic phosphate insecticides: Korlan, Dicapthon, malathion, and diazinon. In order that the percent reduction of a population could

be easily and accurately estimated, only ships having a total cockroach index of 2.5 to 4.0 were used in this portion of the study. The material was applied with a standard Navy 2-gallon sprayer to angle irons of the infested compartments. A hand oiler equipped with an intravenous tube with needle was used to inject the material into cracks and crevices. The insecticide was applied as a residual to all angle irons, and care was taken to inject the material into as many cracks and crevices as possible. Only food-service areas were sprayed and the material was not applied until the galley personnel had completely secured after the evening meal. After the application of the material the sprayed compartments were inspected for cockroach infestation at 1-, 3-, 7-, 14- and 21-day intervals. The percent reduction of the population was estimated by the inspector and the opinions of personnel regularly working in the compartment were taken into consideration. The unscheduled operations of ships caused much concern during this portion of the study. At times ships went to sea shortly after insecticides had been applied and no follow-up visits could be made. In other instances it was necessary for ships to leave port before a second or third application could be made.

All 4 insecticides used gave some measure of control against chlordane-resistant cockroach infestations, but none eliminated the problem in 1 application. A brief summary of results with insecticides follows:

Korlan. When used as a water emulsion, this insecticide is considered to be the least effective of all 4 tested, with very poor initial knockdown. With an oil base, however, knockdown improved. This material was virtually ineffective at 0.5 percent and 1 percent, and at 2 percent there was much to be desired. A strong point in favor of this material is its low mammalian toxicity (acute oral LD_{50} in rats—1800 mg/kg). Not recommended as a water emulsion. Recommend additional tests for possible use as an oil solution.

Dicapthon. Initial knockdown is normally considered as 30 percent of the population. This material has an odor objectionable to many persons. Both a water emulsion and an oil solution stain surfaces. It has an effective residual life of less than 2 weeks, and is most effective at 1 percent. Moderate mammalian toxicity (acute oral LD_{50} in rats—500–1750 mg/kg). Not recommended.

Malathion. Initial knockdown is about 30 percent. The odor of this material is very strong, but lasts for only 1 night. Residual effectiveness is from 2 to 3 weeks. Low mammalian toxicity (acute oral LD_{50} in rats—1375 mg/kg). Highly recommended for general use.

Diazinon. Initial knockdown is slightly better than that of malathion. Residual seems to last from 2 to 3½ weeks. Considered as having a moderate mammalian toxicity (acute oral LD_{50} in rats—108 mg/kg). Recommended for use in special instances.

It is thought that additional tests should be conducted with these and other chemicals in order to evaluate this problem completely. From observations made while applying the various insecticides, it is recommended that malathion be used in controlling shipboard cockroach populations. Best results have been obtained by using 3 applications of 3 percent malathion spaced at 3-week intervals.

SUMMARY

During a 9-month period, 145 ships of 31 types were thoroughly inspected for cockroach infestations and conditions serving to support extensive cockroach development. Only 44 ships (31 percent) were found to be entirely free of cockroaches at the time of inspection.

By assigning a total cockroach index and a total sanitation index to each ship, it was found that as sanitation improves the cockroach population decreases. No recommendations could be made concerning alterations or modifications of the present sanitation technics because, if properly followed, they would result in excellent over-all sanitation and would do much toward eliminating the extreme cockroach population which now exists.

The role of basic ship design in the cockroach problem is a most important consideration and is very closely linked to cleaning and sanitation technics. Some of the more outstanding flaws in ship design are false bulkheads and stainless steel shielding in food-service compartments, cracked and loose insulation and pipe lagging, galley equipment too close to the deck to allow proper cleaning, false bottoms in cabinets and beneath equipment, and grease filters which are difficult to remove from overhead exhaust fans. Recommendations for the correction of these faults are made.

Cockroach resistance to chlorinated hydrocarbon insecticides has become extensive aboard ship. Of the colonies tested, 73.7 percent showed resistance to chlordane, 75.0 percent were dieldrin-resistant, and 63.6 percent were resistant to lindane.

In view of the poor cockroach control being obtained at present, it is recommended that a radical change in procedure be adopted. Experience gained in the application of test insecticides to various ships has indicated that by establishing shipboard pest control units, the control of cockroaches would be obtained with greater efficiency,

economy, and safety. It is believed that shipboard pest control units located in the major ports could successfully schedule and treat infested ships on an exchange-of-funds basis. The pest control unit would supply insecticides, application equipment, protective equipment, and competent supervision. Ships would supply personnel to apply the insecticide. Operational details of a shipboard pest control unit could be resolved by the establishment of a pilot facility.

In order to evaluate substitute chemicals for control of chlordane-resistant cockroach populations, field tests were conducted with Korlan, Dicapthon, malathion, and diazinon. Malathion proved to be most suitable for control of chlordane-resistant cockroach populations. Best results were obtained by using 3 applications of 3 percent malathion spaced at 3-week intervals.

ACKNOWLEDGMENT: The authors wish to thank Captains Robert A. Mount and Walter W. Gilbert, MC, USN, for their guidance and encouragement throughout this study; and Captains Kenneth L. Knight and John D. DeCoursey and Commander Richard T. Holway, MSC, USN, for their help and timely suggestions. The outstanding cooperation received from all units of the Fleet in the San Diego area is greatly appreciated.

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STOP THE PRESSES

Although I firmly believe that the discipline of research or controlled observation is a vital ingredient in medical education, has not the demand for printed evidence of submission to this discipline got somewhat out of hand? Are not journals cluttered up with indifferent work, and does not good work have to wait too long for publication? . . . Perhaps if all journals agreed to stop publication for six months every five years, it might give everyone time for reflection and time to decide whether there is room for both *pointillisme* and polysaccharides, and coproporphyrins as well as Copernicus, and whether Emile Zola's realism and the Zollinger-Ellison syndrome are mutually exclusive phenomena.—J. F. STOKES: A British View of an American Hospital. *The New England Journal of Medicine,* January 8, 1959.

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Aberrant Renal Blood Vessels Causing Urinary Obstruction

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A SO-CALLED ABERRANT RENAL VESSEL was first observed by Eustachius at necropsy in 1552, but the report was not published until 1714.[1] Since that time there have been numerous similar reports. The incidence of aberrant renal vessels is said to be between 25 percent [2] and 50 percent.[3,4]

The embryologic development of the renal arterial supply is well described by Felix.[5] The explanation for the variation of segmental arteries may well be developmental.[6] Graves [7,8] showed that the nomenclature for aberrant renal arteries is wrong; using plastic casts and segmental renal angiography, he was able to demonstrate that the so-called aberrant or accessory arteries are, in fact, normal segmental arteries. We believe that for functional purposes the latter may be called endarteries, since ligation of a segmental artery will be followed by infarction of the supplied area. This is also of importance when partial resection of a kidney is performed. On the other hand, the venous flow has generous collateral circulation, and a venous branch can usually be resected without any difficulty. It has been stated that a segmental artery supplying more than 25 percent of the renal substance should not be resected. We consider this figure too high and avoid resection of a vessel that supplies more than 10 percent of the renal substance.

To find out how much renal substance is involved, it is advisable to inject indigo carmine into the segmental artery [9] rather than to apply a small rubber-shod clamp. Indigo carmine will give good discoloration of the corresponding renal parenchyma. We believe that a clamp should not be used for the following reasons: (1) If the segmental artery is supplying a large area, some renal disturbance

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may occur; and (2) the demarcation can be masked if the venous blood has a high oxygen content.

If a segmental artery produces urinary obstruction and supplies more than 10 percent of the renal substance, the problem may often be solved by division of the renal pelvis followed by pyelo-pyelic anastomosis [10] anterior to the vessel, rather than by dividing the ureter.

In cases of urinary obstruction secondary to segmental vessels, various differential diagnoses should be considered. Because of the different locations of the obstruction, division into the following 3 groups may be helpful: (1) segmental vessels producing an intrapelvic obstruction, (2) segmental vessels producing obstruction at the ureteropelvic junction, and (3) segmental vessels producing obstruction of the upper ureter. For each of these groups we are presenting one case to illustrate the associated problems.

CASE REPORTS

CASE 1. *Segmental vessel causing intrapelvic obstruction.* A 29-year-old woman was transferred to this hospital because of disease of the right kidney. She had had recurrent microscopic hematuria with pyuria for the past 2½ years, associated on several occasions with right flank pain. Antibiotic treatment had afforded some relief. The patient reported that an intravenous pyelogram (IVP) performed elsewhere had revealed an enlarged right kidney.

The patient had been pregnant 5 times and had had 3 cesarean sections. Following the last section, 3 years prior to this admission, bilateral tubal ligation had been performed. Six months prior to this admission the patient had had left lobar pneumonia.

Physical examination revealed tenderness in the right costovertebral angle and a well-healed lower abdominal midline scar. The remainder of the physical examination was not remarkable.

The urinalysis showed 6 to 8 epithelial cells and was otherwise negative. The urine culture showed no growth after 48 hours. Intravenous pyelogram (fig. 1) demonstrated clubbing of the superior calyceal group on the right with a small filling defect in the region of the infundibulum. There was also nephroptosis of the right kidney. Retrograde studies again demonstrated the filling defect. A 24-hour urine culture and smear were negative for acid-fast bacilli.

At operation the right kidney exhibited fetal lobulation and an extrarenal pelvis. A large vein was seen traversing the posterosuperior aspect of the renal pelvis at the point where the superior calyx joined the renal pelvis. Anterior to this point, the main renal artery entered the parenchyma. The vein was clamped and resected without appreciable interference with the renal blood supply, thus relieving the obstruction. On further examination of the renal pelvis, no tumor could be found.

Discussion

Prior to operation a papilloma of the renal pelvis was considered, since the patient gave a history of minimal symptoms associated with

microscopic hematuria.[11] Tuberculosis was also considered in the differential diagnosis. A filling defect similar to that seen in this patient's roentgenogram can sometimes be caused by a calyx arising from the posterior aspect of the infundibulum. In such cases a roentgenogram taken in the oblique position will usually give the correct diagnosis (fig. 2). Resection of the segmental vessel relieved the obstruction that had been the cause of recurrent pyelonephritis.

Figure 1 (case 1). Intravenous pyelogram 10 minutes after injection, without pressure, showing clubbing of upper calyces on the right and filling defect in region of infundibulum.

CASE 2. *Segmental vessels causing obstruction at the ureteropelvic junction.* This 22-year-old white man gave a history of recurrent attacks of right flank pain during the year previous to admission. For 2 weeks before being seen at our hospital he had experienced a constant dull aching pain in the right costovertebral angle.

Past history was negative.

Physical examination findings were essentially negative except for very mild right costovertebral tenderness.

Urinalysis revealed white blood cells too numerous to count. Intravenous pyelogram showed marked caliectasis and pyelectasis on the right side, with delay in emptying because of obstruction at the ureteropelvic junction. Retrograde pyelogram established and confirmed the above findings (fig. 3).

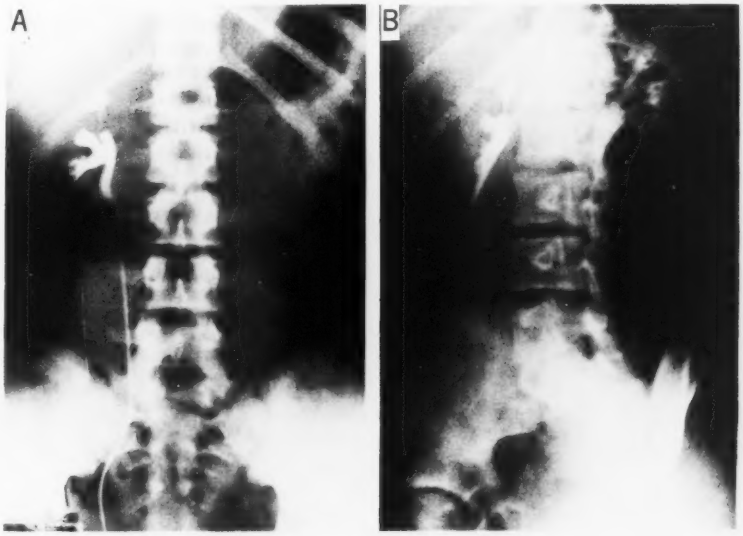

Figure 2. Pyelograms of 14-year-old boy with history of microscopic hematuria. (A) Right retrograde injection, showing filling defect. (B) Intravenous pyelogram in right oblique position 10 minutes after injection without pressure. The superior calyx is now well outlined.

At operation the enlarged renal pelvis bulged anteriorly between the main renal pedicle and two blood vessels, the smaller of which proved to be an artery, running to the lower pole of the kidney. By injecting indigo carmine we were able to demonstrate that this artery supplied less than 10 percent of the renal substance. Resection of the two vessels was performed and was followed by immediate emptying of the renal pelvis. Since injection of sterile saline into the renal pelvis was followed by good peristalsis with prompt and complete emptying, no further exploration of the ureteropelvic junction was thought necessary.

Discussion

Prior to operation, high insertion of the ureter and intrinsic obstruction of the ureteropelvic junction were considered in the differential

diagnosis. Lich and Barnes [12] state that segmental vessels may be present in many cases of intrinsic ureteropelvic obstruction, which may often be valvular in nature. Therefore, if the renal pelvis does not empty completely after resection of a segmental vessel, it is important to calibrate the ureteropelvic junction and proximal portion of the ureter. In our case it was possible to resect the segmental artery with minimal damage to the kidney. However, when the supplied area of the kidney is too large, it is advisable to avoid resecting the artery and to relieve the obstruction by anteriorizing the renal pelvis.

Figure 3 (case 2). Bilateral retrograde pyelogram after removal of ureteral catheters, showing dilatation of calyces and pelvis on right.

CASE 3. *Segmental vessels producing obstruction of the upper ureter.* A 19-year-old white man was admitted to this hospital with a history of intermittent right flank pain. The patient had noted an association between the pain and an increased fluid intake. Four months before admission, following the ingestion of several bottles of beer, he experienced a sudden attack of right flank pain, associated with nausea, vomiting, chills, and fever. He was hospitalized for 4 days.

His laboratory reports were negative. An intravenous pyelogram performed at his local medical facility was reported as showing hydronephrosis and hydroureter due to ureteral obstruction on the right.

Past history was negative.

The right kidney was enlarged and tender. Otherwise the physical examination was negative.

The urinalysis was negative except for 5 to 8 white blood cells per high power field. Urine culture showed no growth after 48 hours. Retrograde pyelogram revealed hydronephrosis with hydroureter due to ureteral obstruction at the level of the transverse process of the fourth lumbar vertebra on the right side (fig. 4).

Figure 4 (case 3). Right retrograde pyelogram, showing hydronephrosis and hydroureter. Note S-shaped configuration of the obstructed ureter.

At operation the kidney was found to be hydronephrotic, with dilatation of the upper segment of the ureter. The renal parenchyma, however, was still healthy. At the point of ureteral obstruction a segmental artery was seen arising directly from the aorta, crossing the ureter and entering the lower pole of the kidney. When indigo carmine was injected into the vessel, less than 10 percent of the renal substance turned blue. The artery was clamped and resected. The entire distal

ureter was then calibrated; no intrinsic strictures were encountered. Normal peristaltic waves were seen passing down the ureter, and the renal pelvis emptied satisfactorily.

Discussion

Since the patient's retrograde pyelogram showed an S-shaped configuration with ureteral obstruction on the right side, the presence of a retrocaval ureter was considered as well as a segmental vessel or fibrous band. The first retrocaval ureter was reported by Hochstetter;[13] more detailed information is given by Goodwin, Burke and Muller.[14] In our case we were able to get good peristaltic waves with complete emptying of the ureter and renal pelvis after the vessel was resected. The S-shaped configuration of the ureter that had been seen prior to resection of the segmental vessel disappeared completely. Fortunately the resected vessel supplied less than 10 percent of renal substance; otherwise a division of the ureter would have been necessary. In such cases, it is recommended that a splinting catheter be left in place after the ureter has been reanastomosed.

SUMMARY

The functional anatomy of so-called aberrant renal vessels is discussed. The segmental vessels causing urinary obstruction are classified into 3 groups, based on the location of the obstruction. One case illustrating each group is presented and the differential diagnostic aspects are considered.

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THE MYTH OF "EFFORTLESS EXERCISE"

A rapidly increasing number of mechanical devices for massage and for producing rhythmical passive movement are being promoted most unscrupulously. The combination of mechanical contrivance, good advertising and the gullible, gadget-loving public is resulting in several multimillion dollar businesses. To the discerning physician, no convincing scientific evidence of beneficial physiologic or therapeutic effects of any of the devices has been reported and confirmed to date. The major claims pertain to supposedly beneficial effects on weight reduction, on relaxation of various kinds of "tensions," and on "toning up" skin and flabby muscles. The "effortless exercise" described as a feature of some of the devices consists merely of rhythmical passive movements which, by no stretch of the imagination, can be expected to increase the general metabolism and caloric output and thereby produce loss of weight. . . . It is time that the members of the medical profession face this particular form of chicanery squarely. Each physician should resolve that he will not become involved in any way in the exploitation of the public by these racketeers, and every physician should be willing to tell his patients frankly about the therapeutic ineffectiveness of such devices.—GORDON M. MARTIN: The Mechanical Gadgets Racket (editorial). *Postgraduate Medicine*, September 1959.

Dermatofibrosarcoma Protuberans

CAPTAIN GILBERT F. MUELLER, JR., USAF, MC

PRIOR TO 1924, when Darier and Ferrand [1] described 4 cases and established the existence of dermatofibrosarcoma protuberans, there had been only scattered individual case reports of this specific but rare malignant neoplasm. The following year, Hoffmann [2] presented a study of 3 cases and established the name, which, though cumbersome, is accurately descriptive. Since then, there has been general agreement that this entity exists. Although Costa [3] describes the tumor as "a progressive, recurrent dermatofibroma because of its slow evolution and absence of metastasis," there are at least 5 cases of documented metastasis. Unlike other neoplasms of sarcomatous origin, the tumor responds to early and proper treatment; so that, despite its rarity (less than 0.1 percent of all tumors),[4] it is especially important for the physician to be aware of this lesion.

The etiology of the entity is unknown. In addition to the usual etiologic factors ascribed to all neoplasms, angiomatous and neurogenic origins have been proposed. Another interesting hypothesis is that these tumors, which arise primarily on the trunk, are of mammary origin. Binkley [5] suggested that they arise in the mammary ridge, and thus explained the presence of multiple tumors without true metastasis. It is now generally believed, however, that the basic component is the connective tissue cell or fibroblast.

CLINICAL COURSE

The lesion usually occurs in middle-aged adults, affecting women almost as often as men. Although almost all races are vulnerable, most cases have been reported in white people. The fact that only approximately 50 percent of patients seek medical care within 5 years of the onset of this tumor attests to the slow progression of dermato-

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fibrosarcoma protuberans. Its evolution can be conveniently divided into 2 distinct stages: the fibrous plaque, and the stage of tumor formation.

Fibrous plaque. Usually one single or several pea-sized subcutaneous nodules appear on the trunk, then coalesce to form a dense, fibrous plaque, which is sclerodermaform, smooth, and hard. Confined to the dermis and subcutaneous tissue, the nodule is usually asymptomatic, but may itch or burn. If incompletely removed, it tends to recur locally. It is not uncommon for a patient to experience multiple local recurrences when the nature of the lesion is not recognized and wide excision is not employed.

Tumor formation. After 1 to 4 years, growth is accelerated in the form of projecting, nodular masses which may grow to fist size within months. The overlying skin is stretched thin, atrophies, and finally ulcerates, with the formation of a soft, fungating granulomatous mass which may attain head size if untreated. Altbough the general health of the patient is usually unaffected, metastasis and death have been reported. Metastasis is thought to occur primarily through the blood stream, as with other sarcomas. Penner [6] described a single case where generalized metastases caused the death of a patient 28 years after the primary lesion had been removed; the lymph nodes examined were entirely free of tumor. Metastases to the lungs, heart, and spleen have been reported.

PATHOLOGY

On cut section, the usual plaque is glistening, gray-white, and homogeneous, although it may be hemorrhagic centrally. Because it infiltrates in a horizontal plane, it separates easily from fascia and muscles. There is seldom invasion of these structures, but fine, linear projections in the dermis extend well beyond the apparent margins. This fact should be kept in mind when the treatment of dermatofibrosarcoma protuberans is considered. The microscopic picture is not diagnostic in itself; the clinical history and gross appearance are essential in establishing a definite diagnosis. The lesion is a cellular fibroma which in some regions resembles fibrosarcoma. Fusiform or spindle-shaped cells are arranged in whorls and histologically are less atypical than in a true fibrosarcoma. A fine capillary or lacunar vessel may be found centrally. There is usually an abundance of collagen, and mucoid degeneration is seen in parts of the tumor. With ulceration at the surface, invasion into the subcutaneous tissue, fascia, and muscle can occur.

TREATMENT

For years the treatment of choice was considered to be local excision and roentgenotherapy. Fibrosarcomas are generally insensitive to irradiation, however, and wide surgical excision is now the treatment of choice. Contrary to most fibrosarcomas, the results with surgical excision alone are excellent when the lesion is recognized and removed before tumefaction develops. Most series are small, and the natural history of the tumor is so prolonged that no accurate "survival" or "cure" rates can be given. Since sarcomas generally metastasize by the blood stream, lymph node dissection is usually unwarranted.[4] Emphasis must be place on extremely wide local excision because of microscopic extension well beyond the suspected borders of the lesion.

CASE REPORTS

CASE 1. This 31-year-old woman first consulted her physician for a pea-sized nodule on her back at the waist line, about 8 cm to the lift of the midline. This lesion had been present only about 3 months and was totally asymptomatic. The nodule was removed and the diagnosis was benign fibroma. It recurred soon after operation in the form of a plaquelike thickening in the scar, approximately twice the size of the original lesion. The patient noted itching and burning within the scar, which she chose to ignore because she had been assured that the original lesion was benign.

Fifteen months later she was seen at this hospital for the first time, complaining of a "lump" in the scar. In the central portion of the healed scar was a firm, flat area measuring 1 x 3 cm, which was homogeneous and slightly bluish in color. The area was excised and a diagnosis was made of dermatofibrosarcoma protuberans with incomplete excision. Following this, a wide excision of the remaining scar, including a margin of 2 cm, disclosed no gross evidence of tumor, but the pathologic report revealed extension of the tumor to the margin. After further wide excision with full-thickness skin flap, however, there was no microscopic evidence of tumor cells. The patient recovered uneventfully from the operation, and 15 months later had manifested no recurrence.

CASE 2. A 50-year-old white woman was admitted to this hospital in August 1958 for removal of a nodule adjacent to an old hysterectomy wound. She was concerned about the growth because of a prolonged history of recurrent "tumor," which had first appeared in 1937 as an asymptomatic pea-sized nodule in the skin of the right groin. This and 2 similar nodules in her leg and arm had been removed, but not examined pathologically. Nine years later a recurrent nodule, somewhat larger and purple-red in color, was noted in the old scar in the groin. In 1949 this was again excised but soon recurred. In 1951 another recurrent nodule was excised, with no pathologic diagnosis. In 1954, under general anesthesia, a painful tumor about 4 cm in diameter was excised with underlying tissue to the fascia, including a block dissection of lymph nodes in the area. On cut section, the mass was described as firm, gray-white, slightly glistening, and en-

capsulated, "with a maximum diameter of 12 mm." Microscopically (fig. 1), there was a partly circumscribed mass in the corium, with some invasion into the adjacent fatty tissue, consisting of nests and sheets of spindle cells of various sizes, arranged in bands and whorls about vacuolated spaces. Mitotic figures were uncommon. The microscopic picture, plus the clinical history and gross description, were considered diagnostic of dermatofibroscarcoma protuberans by the Armed Forces Institute of Pathology.

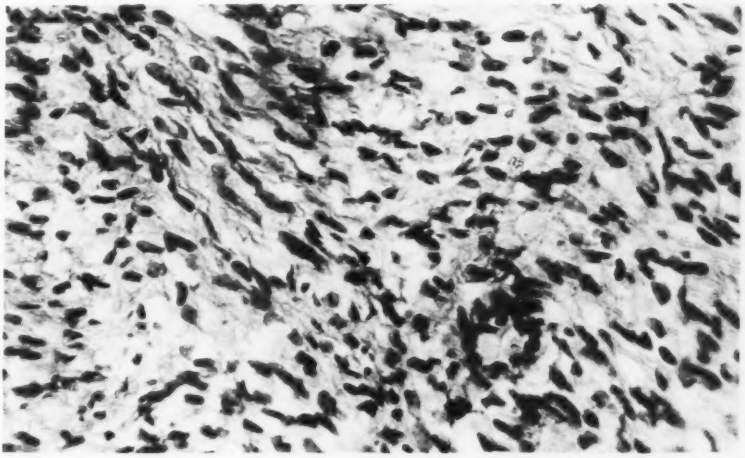

Figure 1 (case 2). Photomicrograph of dermatofibrosarcoma protuberans, showing sheets of spindle cells of varying sizes. Two mitotic figures are present. The microscopic picture is not in itself diagnostic of the tumor. (x 375)

The small nodule adjacent to the abdominal scar which was removed in August 1958 at this hospital was composed of whorls and collagenized connective tissue with uniform ovoid cells and was considered entirely benign. The old scar in the right groin was well healed without evidence of recurrence. No other abnormality was found. As of April 1959, it had been 12 years since the onset of the groin tumor and 4¼ years since the last operation for its removal, during which time there was no evidence of recurrence of dermatofibrosarcoma protuberans.

SUMMARY

The clinicopathologic entity dermatofibrosarcoma protuberans is discussed and 2 case reports are presented. Unlike most neoplasms of connective tissue origin, the natural history is prolonged and metastasis is rare. It is important that the clinician be aware of this

tumor and its characteristics so that early and adequate surgical removal can be accomplished.

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THE NEW NEUROLOGY

Modern clinical neurology is tending to veer away from the minutiae of the neurological examination in favor of a broader study of the patient. The precise localization of the lesion has given way to an analysis of the disturbance of function in terms of the underlying physiological, biochemical and metabolic disturbance. Accuracy of localization by a careful neurological examination is not to be decried, but lesions in the nervous system, particularly in the case of tumor where localization is so important, can now be sharply delimited by electroencephalography, pneumoencephalography, angiography, and myelography. The surgeons, who operate on patients, desire information with regard to exact extent, blood supply and the like, which can be obtained from these special tests. They are rarely willing to operate on patients without this valuable additional information. The clinicians who deal with other organic and functional diseases of the nervous system now turn to the physiologist and biochemist for aid in the solution of their problems.—H. HOUSTON MERRITT: The Evolution of Neurology. *Bulletin of the New York Academy of Medicine*, November 1959.

Renal Biopsy

Observations and Preliminary Experience At Brooke Army Hospital

MAJOR ROBERT H. MOSER, MC, USA

A SLOW REVOLUTION is occurring in the field of renal pathology. Methods of estimating glomerular and tubular function have advanced our knowledge of renal physiology to a point where we have become aware of the inadequacy of current classifications of renal pathology. To superimpose the dynamic changes of renal physiology upon the archaic framework of postmortem pathology is patently unsatisfactory. The percutaneous renal biopsy has been the revolutionary tool. Since 1950 and 1951, when Pérez Ara [1] in Argentina and Iversen and Brun [2] in Sweden described the first biopsies, this technic has gained increasing recognition and approval.[3-8]

At this hospital renal biopsy is employed as an ultimate weapon, to be utilized when other less hazardous technics have failed to yield specific diagnostic information. It is our feeling that this procedure should be added to the diagnostic armamentarium of every institution that encounters a significant volume of kidney diseases. The purpose of this paper is to review the general contributions made by renal biopsy, the indications for and contraindications to the procedure, and one acceptable technic. In addition we shall recount the early experience with this procedure at our hospital.

CONTRIBUTIONS

From an experimental aspect biopsy material obtained in conjunction with tests for physiologic renal function has greatly implemented pathophysiologic correlation.[9-11] The employment of

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electron microscopy [12, 13] and specific biochemical stains [14] applied to biopsy material taken at intervals during the natural evolution of specific renal diseases afford essential data on pathogenesis.[15, 16]

As experience grows and more percutaneous biopsies are obtained in a wide variety of disorders, it is apparent that an entirely new area of information is forthcoming. Pathologic configurations traditionally assigned to specific disease states are being found in other, previously unappreciated entities. Examples of this may be found in the report of Berman,[17] who performed biopsies on patients with pulmonary tuberculosis but no evidence of renal disease and discovered changes in the glomerular capillary basement membrane. We have seen the so-called "pathognomonic" wire-loop changes of lupus erythematosus in a patient with the nephrotic syndrome and no historical, physical, or immunologic evidence of lupus. Other examples may be found in the renal biopsy literature.

From a practical aspect, until further information compels revision of current pathologic concepts, we shall continue to rely upon information gained from both surgical [18] and postmortem material, employing the percutaneous biopsy as a simple method to obtain tissue. Diagnoses of amyloid,[19] sarcoid,[20] renal cysts,[21] multiple myeloma,[22] lower nephron nephrosis,[23] and other entities have been made or confirmed by renal biopsy.

From the aspect of therapy, there is no better way to study the effectiveness of a specific treatment regimen than the serial biopsy technic. It has already proven of value in assessing the role of steroids in the nephrotic syndrome.[15, 16, 19] It would seem to lend itself as well to the study of antihypertensive programs as they affect renal vasculature;[18, 24] in the appraisal of steroids in collagen diseases involving the kidney;[25, 26] in the management of the renal complications of metabolic diseases (Kimmelstiel-Wilson,[27] Cushing's,[28]) and of obstetric toxemias;[29, 30] and in the knotty problem of drug therapy in pyelonephritis.[31]

INDICATIONS

Our current indications are similar to those of others.[32]

1. Proteinuria.
   a. The nephrotic syndrome.
   b. Idiopathic albuminuria.
   c. Pyelonephritis (in which the 24-hour urinary output of protein exceeds 2 grams).
2. Pyelonephritis (acute and chronic). Biopsy is not done routinely but rather in cases where a strong clinical suspicion is entertained and urinary sediments and cultures have been unrewarding.

3. Hypertension, the cause of which has escaped detection and in which a renal component is strongly suspected.
4. Systemic diseases whenever diagnosis remains elusive but may be revealed by examination of renal tissue (for example, lupus erythematosus, sarcoidosis, amyloid disease, bacterial endocarditis).

CONTRAINDICATIONS

Again, our contraindications are similar to those of others in the field.[32] We do not perform biopsy if there is evidence of any of the following:

1. Single functioning kidney (by intravenous pyelogram or by history of surgical removal).
2. Blood dyscrasia.
3. Anomalous renal vessels.
4. Atypical position of the kidneys.
5. Malignant hypertension.
6. Patient's inability to cooperate, because of immaturity, abnormal behavior, or inordinate fear.

In other series, extreme uremia or terminal states have been listed as contraindications, but we have performed biopsy on a few of these patients without difficulty.

PROCEDURE

The patient is admitted to the medical ward, where complete diagnostic study is undertaken to establish the diagnosis prior to biopsy. An intravenous pyelogram is obtained, unless recent retrograde or intravenous pyelograms are already available. The hematocrit must be above 32 ml per 100 ml or hemoglobin above 9 grams per 100 ml. If the candidate cannot meet these arbitrary minimal requirements, he must be brought to this level by transfusion prior to biopsy. Renal function tests must include urinalysis and a Sternheimer-Malbin [33] stain of the sediment studied by the requesting physician, blood urea nitrogen, phenolsulfonphthalein excretion, and 2 assays for total urinary protein each performed on a 24-hour urine collection. In many instances we have performed clearance studies and paper electrophoresis of serum and urine for protein determination.

Following this work-up, the case is formally presented to the renal biopsy team for final evaluation. A presumptive diagnosis is recorded. If acceptable for renal biopsy, the final work-up consists of:

1. Bleeding time (Ivy)
2. Clotting time (Lee-White)

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3. Prothrombin time (Quick)
4. Study of fresh peripheral smear for platelet estimate by referring ward officer
5. Freshly voided A.M. urine for sediment study by renal biopsy team on morning of procedure
6. Completion of renal biopsy form
7. Signed operative permission
8. Transfusion of 2 pints of compatible blood on ward
9. Telephone notification to urology service as to time and place of procedure

The actual technic is rather simple (fig. 1). Intravenous pyelography is performed to delineate landmarks. A target point (X in fig. 1) is selected at the junction of the middle and lower thirds of the area encompassed by the lowermost calyx and the lateral margin of the lower pole of the kidney. The lower pole is believed to be relatively less vascular than other areas. With this target point established, a line is drawn connecting the spinous processes of the vertebral bodies. A second line is drawn along the inferior edge of the twelfth rib. If this rib is too short (as it is in the film presented), the eleventh rib is used as a landmark. A third line perpendicular to the spine is

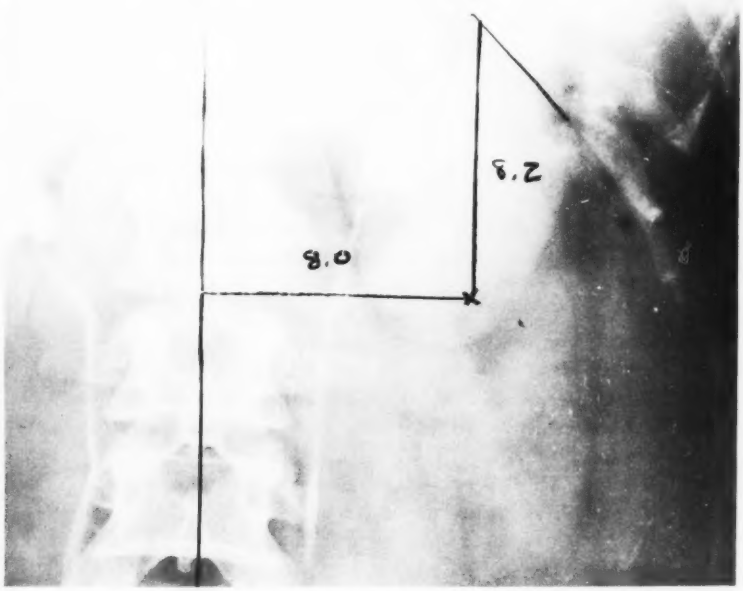

Figure 1. Final measurements from target point to fixed landmarks (average of several intravenous pyelograms).

then drawn to the target point. A fourth line perpendicular to the third line and parallel with the first connects the target point with the line along the twelfth or eleventh rib. Measurements of the third and fourth lines are made on several films, and a reasonable average is taken to use as landmarks on the patient.

At the bedside the patient, previously sedated with meperidine hydrochloride and chlorpromazine hydrochloride, is placed in the prone position with 2 pillows under his epigastrium. His shoulders are placed squarely on the mattress with his head turned away from the operator. The left side is usually selected because of ease for a right-handed operator, but the right side may be used if the spleen is enlarged or if a specific indication exists for a right kidney biopsy. The measurements, as determined on the films, are then drawn with a skin pencil, utilizing rib and spinous process landmarks (fig. 2). The skin over the target point is cleansed and anesthetized.

Figure 2. Landmarks identified and target point "triangulated" on patient.

A long 20-gage spinal needle is used to explore and locate the lower pole of the kidney. The kidney can usually be detected by a distinct change in the consistency of the tissue as the needle passes through muscle and perinephric fat and into renal cortex. Other signs that will facilitate the localization of the lower pole of the kidney are the distinct

respiratory swing of the kidney (fig. 3), which moves caudad with inspiration and cephalad with expiration. Occasionally a distinct pulsation will be detected through the needle; this apparently comes from the large volume of blood surging through the renal artery and transmitting an impulse throughout the entire kidney. The renal capsule is infiltrated with novocaine, and the depth at which the exploratory needle has contacted the kidney is marked by finger. The biopsy needle is removed from the tray with trochar in place; a paper clip is placed on the outer sleeve of the biopsy needle at the point corresponding to the depth at which the kidney was contacted with the exploring needle. The biopsy needle (fig. 4) is a modified Vim, 8 inches in length, with the hollow tips of the cutting blades filled in to facilitate cutting the specimen from the renal tissue.

A small skin incision is made, and the outer sleeve, with trochar in place and clip attached, is advanced to the level of the renal capsule along the track of the exploring needle. It is imperative that the needle be placed barely in contact with the capsule and not imbedded in the cortex. It must be remembered that the Vim-Silverman needle

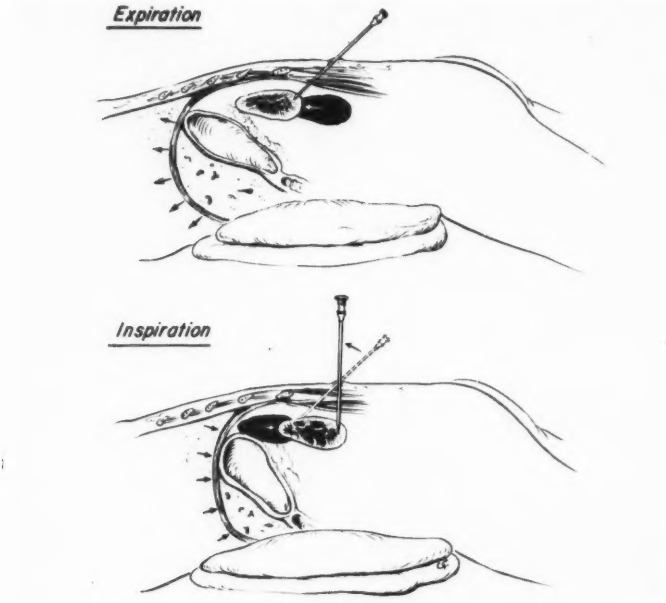

Figure 3. Diagram of "respiratory swing" with biopsy needle in proper position.

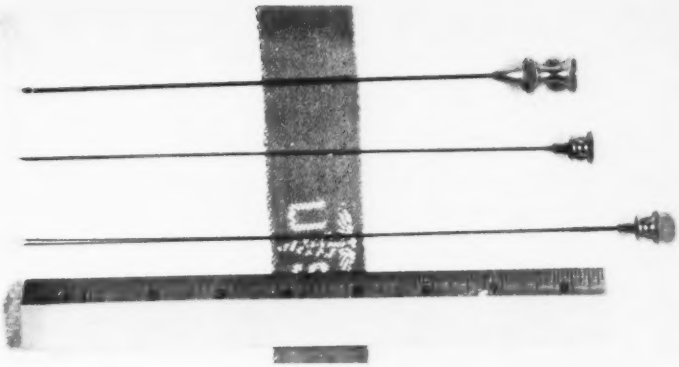

Figure 4. Biopsy needle assembly.

cuts from the end of the outer sleeve; if this is imbedded in the cortex too deeply, the actual biopsy specimen may be taken entirely from the medulla, in which instance it is worthless. With the needle and trochar in contact with the capsule, the patient is asked to take a moderately deep breath and hold it. The kidney will descend and remain motionless. The trochar is quickly removed and the cutting blades are inserted down to the level of the capsule. The outer sleeve is then fixed by the left hand tightly against the skin and the cutting blade is snapped into the kidney tissue. The cutting blade is then fixed by the right hand, and with the left hand the outer sleeve is rotated around the cutting blade to sever the specimen from the surrounding tissue. After a final 360° rotation of the outer sleeve, the entire needle assembly is withdrawn and the patient is permitted to breathe. The specimen is immediately placed in formalin. Renal tissue will settle to the bottom of the specimen bottle, but perinephric fat will float. Cultures of the needles are then made at the bedside, and the procedure is complete. An experienced operator may perform the entire biopsy procedure in 2 to 4 minutes. There is great variation in position and depth of the kidneys, and we have encountered 5 patients with acceptable pyelograms in whom repeated biopsy attempts have been unsuccessful.

Immediately following the biopsy, a note describing the procedure is placed on the patient's chart and postbiopsy orders are written by the operating physician.

The postbiopsy orders are:

1. The patient must remain in the prone position for 1 hour following the procedure.

2. Vital signs are to be checked every 15 minutes for 1 hour, every 30 minutes for the next 3 hours, and every hour for the next 8 hours.
3. The patient may assume any comfortable position after 1 hour but must remain in bed for 24 hours.
4. The patient is permitted to use the bedside commode. All urine samples are to be kept at the bedside and bottles labeled with the time of passage for the first 24 hours after the procedure.

The renal biopsy team member who performed the actual procedure is available by telephone in case of any untoward reaction.

EXPERIENCE AT BROOKE ARMY HOSPITAL

Our experience is modest compared to that of others older in the field. Our series began in mid-March of 1958 after a brief period of instruction and orientation under the guidance of Dr. Leonard B. Berman of Veterans Administration Hospital, Washington, D.C. Our technic and approach are based on this experience, with a few minor modifications. All biopsies have been performed by 3 residents in medicine and the author. We have obtained diagnostic tissue in 43 instances out of a total of 60 biopsy attempts on 40 patients. In 5 patients one or more biopsy attempts were unrewarding. Unfortunately, none of these patients demonstrated characteristics that would serve to distinguish them from the others, in whom biopsy was easily obtained.

Table 1 is a comparison of our small series with those of Kark and co-workers [32] and Brun and Raaschou.[34] It will be noted that we have included in our series 1 patient to whose death renal biopsy is felt to have contributed (footnote, table 1). This patient was in acute renal shutdown from an unknown cause (later established as acute glomerulonephritis). Retrograde pyelography had been associated with significant traumatic bleeding from the left renal pelvis, and despite this major contraindication a renal biopsy was performed. The subsequent course included intermittent daily extracorporeal dialyses and was complicated by a perinephric hematoma, which subsequently became infected. At necropsy, both the tract of the biopsy needle and the site of a perforation from the renal pelvis to the surface of the kidney, inflicted by the retrograde catheter, were unhealed and necrotic.

We have performed repeat biopsies on 8 patients. In 4 of these, young men whose findings were consistent with nephrotic syndrome, the effects of prolonged steroid therapy were studied in an attempt to correlate clinical and pathologic response. The other 4 were patients with chronic pyelonephritis. One of these had associated

gout and another had systemic lupus erythematosus without renal involvement. In this latter group the second biopsy was obtained in an effort to observe the effects of prolonged therapy with antibiotics, as indicated by sensitivity tests, upon the pyelonephritic process.

Table 1. ***Complications of renal biopsy in 3 series of patients***

	Kark and coworkers [32] *(500 attempts on 368 patients)*	*Brun and Raaschou* [34] *(510 attempts on 406 patients)*	*Author's series (60 attempts on 40 patients)*
Diagnostic tissue obtained	401	268	43
Death	0	0	0*
Nephrectomy	0	0	0
Operation	0	0	1**
Gross hematuria	26	40	2
Persistent hematuria	3	33	0
Hematoma	3	1	1***
Transfusion	2	11	0
Postbiopsy pain	22	37	1
Renal colic	14	5	0
Fever	15	–	0
Ileus	–	–	1**

*In 1 patient it was believed that renal biopsy may have been a contributing cause of death (see text).

**Patient in whom exploratory laparotomy performed because of mild ileus disclosed nothing.

***Patient in whom, following a first biopsy, second attempt was unsuccessful, because of perirenal fibrosis. No roentgenographic evidence of perirenal calcification; patient asymptomatic.

SUMMARY

The value of renal biopsy as a laboratory tool is gaining wider acceptance as experience continues to accumulate. A brief review of the procedure is presented, including its contributions, indications and contraindications; an acceptable technic is described; and preliminary experience gained at a large military hospital is outlined. It is believed that this technic represents an important advance in the study of renal disease and should be employed in every hospital in which the management of a significant volume of medical renal disease is undertaken.

ACKNOWLEDGMENT: The author wishes to express his appreciation to Miss Sue Bond for her excellent stenography and proofreading.

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FRESH VIEWPOINT

It usually does good to any organization if from time to time someone in authority sits down to ponder upon its aims, methods, and achievements, and then commits his thoughts to paper. Slowly and sometimes unnoticeably problems change and their solutions too, and day-to-day routine may distort the best of plans. An occasional review gives the opportunity for a new start.—A World Scene (Annotations). *The Lancet*, September 19, 1959.

Hypofibrinogenemia; An Approach to Recognition and Management

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CAPTAIN JACK E. BIRGE, MC, USAR

CASES OF AFIBRINOGENEMIA or hypofibrinogenemia have been reported in most medical fields of specialization, and not infrequently in urology, general surgery, internal medicine, and thoracic surgery. However, the condition deserves more than a "can occur" stature in obstetrics. For this reason, a practical approach to the recognition and management of hypofibrinogenemia accompanying obstetric conditions must be formulated.

What is considered a practical approach may not be so obvious in view of what is known and postulated about this entity. Most obstetric writings are focused on theories of pathogenesis and on the associated or preceding complications of pregnancy. This approach fosters a hindsight diagnosis of the condition, revolving, as it does, on specific predisposing or associated obstetric conditions rather than on the possible presence of hypofibrinogenemia. When hypofibrinogenemia develops, as it may, in situations other than those usually reported, delay in diagnosis is apt to occur because of a false sense of security. A forward practical approach to this condition can be established only if the diagnosis is anticipated not only in the reported predisposing obstetric complications, but in any case of obstetric hemorrhage.

At this hospital, 3 cases of hypofibrinogenemia were diagnosed and treated during the period from September 1955 to October 1958. This constitutes an incidence of 1 in 2,256 deliveries, in no way statistically significant because of the limited reporting period. Of the 3 cases, 1 was classic, following a severe abruptio placentae. The other 2 were not as typical; and the associated obstetric conditions, although falling within the category of the less frequent situations in which this phenomenon has been reported, were not severe enough to cause any great concern.

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CASE REPORTS

CASE 1. A 37-year-old white woman, gravida 4, para 1, section 1, ectopic 1, was registered in the obstetric clinic on 10 March 1955. Her first pregnancy had been terminated by uneventful vaginal delivery. The second pregnancy had been tubal and was terminated by laparotomy, and the third had ended in the eighth month, by cesarean section, the reason for which was obscure. Her antenatal course had been uneventful, with no evidence of toxemia or excessive weight gain. She was admitted to the hospital for elective repeat cesarean section on 15 September 1955. Pelvic and abdominal findings were considered normal and consistent with the estimated date of confinement of 25 September. Her laboratory findings were all within normal limits.

On 16 September, a low cervical cesarean section was accomplished without difficulty. An 8-lb infant was delivered in good condition. The patient received approximately 250 ml of blood during the operation. Transfusion was discontinued because of generalized urticaria controlled readily by an antihistamine (Benadryl). Complete laboratory check of the blood being transfused revealed no incompatibility. The immediate postoperative course was without incident until approximately 2 hours later, when uterine hemorrhage, oozing of blood from venipuncture sites and the abdominal wound, and resultant shock became apparent. Urinary output was adequate and the urine exhibited no gross change. Venous blood was drawn and was observed to clot poorly. Diagnosis of hypofibrinogenemia was made and therapy instituted in the form of whole blood and fibrinogen (Parenogen). A total of 2,500 ml of blood and 12 grams of fibrinogen was required to control hemorrhage and correct shock over a 24-hour period. Samples of blood drawn for laboratory analysis at the time of initial hemorrhage later revealed a plasma fibrinogen level of 155 mg per 100 ml, an icterus index of 70 units, and a normal prothrombin time. Repeat studies after control of hemorrhage and shock revealed a plasma fibrinogen level of 450 mg per 100 ml.

Although hemorrhage did not recur, jaundice persisted over the next 3 weeks. Laboratory evaluation indicated this to be hemolytic in origin, requiring repeated transfusions to maintain the hemoglobin at about 9 grams. Hemolysis subsided on cortisone therapy and jaundice subsequently disappeared. The patient was discharged on the thirty-second hospital day, essentially well.

CASE 2. A 23-year-old Negro woman, gravida 2, para 0, abortus 1, with an estimated date of confinement of 5 January 1958, was admitted to the hospital on 23 December 1957 with ruptured membranes. She had gained 6 lb in the week before admission, with a total gain of 17 lb. Her prenatal course had been previously uneventful, with normal blood pressure and urine findings. General examination revealed slight pretibial edema, blood pressure 134/80 mm Hg, funduscopic examination normal. Obstetric examination revealed a term uterus with cephalic presentation, not in labor. Urinalysis revealed normal findings. Pelvic measurements previously determined in the obstetric clinic had been normal. The patient was placed on a 1,000-calorie diet, high in protein, low in fat and carbohydrate, and sodium poor. Phenobarbital, 30 mg 4 times a day, and Diamox (brand of acetazolamide), 250 mg daily, were instituted.

The patient lost 4 lb and blood pressure returned to normal within 24 hours. Urine was consistently negative. On 25 December 1957, the patient went into spontaneous labor. An infant weighing 6 lb, 13 oz was delivered uneventfully

by low forceps over a mediolateral episiotomy and under saddle Nupercaine anesthesia. The infant was in poor condition, and although heart tones were maintained for approximately 8 minutes, respiration was never established. Length of labor was 15 hours and 52 minutes.

Approximately 15 minutes following delivery, uterine bleeding was noted and shock ensued. A check for lacerations, uterine inertia, rupture, and retained placental fragments was negative. Blood noted oozing from the repaired episiotomy and venipuncture sites failed to clot even on long standing. Clotting of venous blood in the test tube required nearly an hour and the clot disintegrated.

The presence of hypofibrinogenemia was established immediately, however, by gross failure of the blood to clot. The patient responded rapidly and progressively within the next 2 hours to a total of 2,500 cc of whole blood plus 6 grams of fibrinogen. An additional 500 ml of blood was given the following day to correct the still existing anemia. The patient's recovery was uneventful. A fibrinogen level was not determined during the acute phase, but was normal on the day following treatment. The patient was discharged on the eighth postpartum day.

CASE 3. A 20-year-old white woman, gravida 1, para 0, with an estimated confinement date of 17 July 1958, was first registered in the obstetric clinic on 30 January 1958. General physical and obstetric examinations were within normal limits. Her course was uneventful, with normal blood pressure and urine findings, until 23 July, when she was admitted to the hospital because of a sudden gain of 4 lb within a 1-week period, ankle edema, blood pressure 140/80 mm Hg, and a trace of albumin on urinalysis. The routine 1,000-calorie diet, high in protein, low in fat and carbohydrate, and containing 500 mg of sodium, was instituted. Diuril (brand of chlorothiazide) was added on the third hospital day because of persisting borderline hypertension and failure to lose weight.

On 27 July, tne fourth hospital day, the patient complained of the sudden onset of severe abdominal pain with associated bright red vaginal bleeding. Examination revealed a tense, tender uterus, absence of fetal heart tones, and tachycardia. Following typing and cross typing, a sterile vaginal examination revealed the cephalic presenting part to be at zero station with cervix effaced. An amniotomy was performed, but labor did not ensue. Because of persistent tachycardia in spite of blood replacement and tetanic uterus increasing in size, a low cervical cesarean section was performed. The placenta was found to be completely detached with a retroplacental clot of approximately 500 ml. The uterus was moderately ecchymotic. Bleeding at operation was readily controlled, but during closure of the abdominal wall, diffuse oozing with failure to clot was noted. Venous blood was drawn and observed to clot loosely in 5 to 6 minutes; the clot completely fragmented within 30 minutes. This was considered sufficient evidence to establish a diagnosis of hypofibrinogenemia. Plasma fibrinogen level at this time, as reported later, was 150 mg per 100 ml. The patient had received a total of 1,000 ml of blood preceding and during the operative procedure. Following the diagnosis of hypofibrinogenemia, an additional 1,000 ml of blood, in addition to 5 grams of fibrinogen, was required to control shock and halt the bleeding tendency. The blood fibrinogen level following administration of the fibrinogen was 396 mg per 100 ml. The remainder of the patient's course was relatively uneventful except for a hematoma under the anterior flap of her Pfannenstiel incision, which resolved without incision or drainage, and she was discharged on the sixteenth postoperative day.

DISCUSSION

Obstetric entities predisposing to hypofibrinogenemia must not be ignored. In obstetric teachings hypofibrinogenemia is most commonly reported in association with abruptio placentae.[1] Amniotic fluid emboli are reported as the next most frequent precursors,[2] with fetal death in utero a likely third candidate.[3–5] Other less frequent situations with which fibrinogenopenia has been linked are eclampsia, postpartum hemorrhage, surgical or obstetric trauma, renal cortical necrosis, pituitary necrosis, hydatidiform mole, and incompatible blood transfusions.[6, 7]

Theories as to etiology are numerous and interesting, but most revolve around the belief that defibrination of the circulating plasma is the major factor.[2, 4–12] Fibrin is either destroyed by fibrinolysis or immobilized by some substance entering the maternal circulation, the end result in either case being depletion of fibrinogen. However, consideration of either of these theories is of little practical value if the results—the defibrination with hemorrhage—are not sought for. That defibrination is occurring can be only speculative or anticipative in any given case. That it has occurred can and should be readily diagnosed. Every case of uterine hemorrhage must be a suspect hypofibrinogenemia.

Of the 3 reported cases, each can be linked with predisposing or probably predisposing obstetric conditions that have been reported with defibrination. However, the links in both case 1 and case 2 are meager. Case 1 apparently underwent a rather serious transfusion reaction, but of an immediate clinical nature which would not be expected to produce any devastating results. Observance of bleeding and blood testing for coagulation were the lifesaving keys to diagnosis and treatment. Case 2 might be linked with toxemia, but again, toxemia was clinically mild and unalarming and certainly not enough in itself to arouse a high index of anticipation. Obviously, the fetal death might imply a much more severe degree of toxemia than physical and laboratory findings suggested. Nevertheless, this is a hindsight factor. Case 3 was rather typical of those following abruptio placentae.

As proposed in the introduction, the real purpose of this paper is to emphasize the need for a direct approach to the management of hypofibrinogenemia, based on early suspicion and recognition of the entity. Although a thorough understanding of the associated and predisposing obstetric and surgical conditions helps to orient one to the problem, one must guard against the pitfall of looking for these factors and not for hypofibrinogenemia itself. The condition is a

possibility in every obstetric hemorrhage and steps should be taken immediately to confirm or rule out its existence. These steps are too simple and direct to be ignored, and can be readily affixed to any bleeding routine in the delivery room or even in the home. The determination of the blood fibrinogen level is not necessary to confirm the diagnosis and its usefulness in obvious acute hemorrhagic episodes is precluded by the time factor involved in laboratory processing.

It has been stated that a fibrinogen level of less than 50 mg per 100 ml is critically low and that levels below 100 mg per 100 ml may indicate the need for fibrinogen.[12] Two of the cases reported above, in which fibrinogen levels of 150 mg per 100 ml were recorded, would not appear to bear out this statement; yet both of these patients exhibited acute hemorrhage. It is to be noted that all 3 cases presented here were diagnosed strictly on clinical grounds and on observing the clotting of freshly drawn venous blood. Blood was drawn for fibrinogen determinations strictly for later confirmation, and therapy was instituted without these determinations. Actually, however, blood level determinations of fibrinogen are of value in depicting the trend in those cases that develop gradually. In such conditions as known missed abortions, for example, serial analyses of blood fibrinogen have revealed a gradual fall, often over a period of several weeks.

Practically, the failure of freshly drawn blood to clot or to form a normal-sized, stable clot that does not dissolve in an hour,[13] incubated or not, presents sufficient evidence of hypofibrinogenemia and therapy should be immediately administered. A short cut to this procedure is the examination for rapidity of clot formation by the addition of human thrombin (Fibrindex) to the venous blood. Addition of Fibrindex to blood with a normal fibrinogen level is reported to produce a firm clot within 60 seconds. It is the utilization of these simple observations in every case of obstetric hemorrhage that will provide a practical and workable approach to this entity.

Under no circumstances should the physician be panicked into the diagnosis of hypofibrinogenemia as a substitute for other causes of hemorrhage without definite proof by clot analyses. Administration of fibrinogen is potentially hazardous in view of the dangers of viral hepatitis,[14] and must be reserved as a specific lifesaving procedure.

SUMMARY

Three cases of postpartum hypofibrinogenemia are presented. One was associated with detachment of the placenta, another with mild

toxemia, and the third with transfusion reaction. In each case the diagnosis was made on clinical observations and on failure of freshly drawn venous blood to clot normally. Response to whole blood transfusion and the administration of fibrinogen was satisfactory in all 3 cases.

A plea is made for the early recognition and prompt treatment of obstetric hypofibrinogenemia. The abnormality should be suspected in all instances of obstetric hemorrhage, whether or not accompanied by conditions such as abruptio placentae, eclampsia, trauma, or transfusion incompatibility usually considered predisposing. The diagnosis is readily made by observing the clotting of freshly drawn blood, and therapy should not be withheld while waiting for fibrinogen determinations.

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Achalasia of the Esophagus

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ACHALASIA OF THE ESOPHAGUS has been recognized as an entity for over a century. Von Mikulicz [1] in 1882 theorized that achalasia was the result of a true spasm of a cardiac sphincter. The disease at this time was referred to as mega-esophagus. Einhorn [2] and later Hurst [3] looked at the other side of the coin and propounded the theory of a "failure of relaxation" of the cardiac sphincter; they termed the condition achalasia. Further study revealed that a cardiac sphincter as such does not exist,[4] but rather that reflux of gastric contents is normally prevented by the obliquity of the cardioesophageal junction.

Histologic studies by Rake [5] in 1927 demonstrated the absence of, or degenerative changes in, the cells of Auerbach's plexus in the wall of the lower esophagus in achalasia. This led to the theory that achalasia is due to a preponderance of sympathetic control and that as a result muscular coordination is not possible. It is known that vagal denervation with esophageal mobilization will create cardiospasm and a dilated esophagus for 3 to 5 weeks before automatic control reappears. It should be mentioned, however, that Auerbach's plexus is not always defective in achalasia.

The finding that amyl nitrite and ergotamine will cause dilatation of the terminal esophagus in some patients supports the theory that the lesion is on a physiologic basis. Nemir and Hawthorne,[6] as well as others, have demonstrated that there is a total lack of rhythm and a marked decrease in amplitude and frequency of contractions in achalasia, the result being a churning rather than a propulsive movement. However, ingestion of 100 ml of 1 percent procaine temporarily improves the efficiency of the esophageal musculature.

Since World War II, there has been a reawakening of interest in surgical procedures for relief of this condition. Briefly, it may be said that all procedures which enter the lumen of the esophagus and stomach, rearrange the architecture at the cardioesophageal junction, or implant the esophagus elsewhere in the stomach have resulted in

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a prohibitive incidence of reflux esophagitis, dysphagia, stricture, and hemorrhage. The results have been excellent [4, 6] when an esophagogastric myotomy or modification thereof [7] is employed.

The procedure employed at present is a modification of a transabdominal operation originally reported by Heller [8] in 1912. Ravitch,[9] in commenting on Tuttle's[7] paper, stated that he had had a recent letter from Heller, who still practices in Leipzig. Heller has never ceased to perform the operation, and has continually had good results, but has never been able to convince his countrymen of its value. The French, on the contrary, adopted the operation at once and have continued to perform it ever since.

In the operation as originally reported, the muscle of the esophagus and stomach was split to the mucosa both anteriorly and posteriorly. Most surgeons today perform this operation through the left chest, and split the muscle to the mucosa from the level of the inferior pulmonary vein to 1 inch past the cardioesophageal junction on the anterior or anterolateral surface. Excellent results with minimal complications and negligible mortality have been the rule with this operation. Reflux esophagitis is unusual, although regurgitation of barium into the esophagus from the stomach can be demonstrated in 50 percent of cases postoperatively.[3]

Three recent cases demonstrate interesting facets of the problem.

CASE REPORTS

CASE 1. This 20-year-old airman was admitted to the neuropsychiatric service with a primary diagnosis of schizophrenia. In addition, he vomited all of his meals. Barium swallow demonstrated the presence of achalasia. Esophagoscopy revealed nothing of note, the instrument entering the stomach with relative ease. Hydrostatic dilation failed to alleviate his vomiting, and he was becoming significantly malnourished.

A cardioesophageal myotomy was performed in September 1958. During the postoperative period, the patient ate his elastoplast wound dressing and also the daisies from his bedside table. Since this could not all be removed through an esophagoscope, he was reoperated, the esophagus opened, the elastoplast removed, the mucosa sutured, and a feeding gastrostomy constructed. His hands were encased in plaster.

Following this procedure, his recovery was uncomplicated. Four months later, after successful psychotherapy, he was separated from the Service. Vomiting did not recur after the operation and the patient was becoming obese when last seen.

CASE 2. A 19-year-old infantryman was hospitalized with a peroneal palsy secondary to a fracture. For several years he had had difficulty eating solid food, and often vomited undigested food. He could get adequate nourishment only by consuming an excess of fluids, and was losing weight. The diagnosis of achalasia had been made before, and he had been told nothing could be done.

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Esophagoscopy did not reveal esophagitis. Dilation to 45 F with Hurst mercury-filled dilators was fruitless on 2 occasions. After cardioesophageal myotomy, he had a benign convalescence, was eating a regular diet by the third postoperative day, and has remained totally asymptomatic. Figure 1 reveals the dramatic change in esophageal diameter 1 week after operation.

CASE 3. A 29-year-old enlisted man was hospitalized for tuberculosis during parts of 1957 and 1958, permitting observation of the gradual enlargement of his esophagus over a 20-month period, as shown in figure 2. He was treated with both hydrostatic and mercury-filled bougie dilators with transient relief of dysphagia and vomiting.

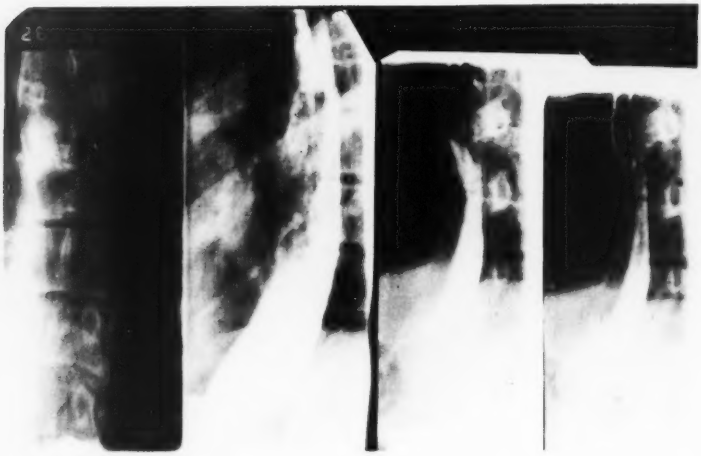

Figure 1. The esophagus reveals return to normal diameter 1 week after operation. The two roentgenograms on the left are preoperative; the two on the right postoperative.

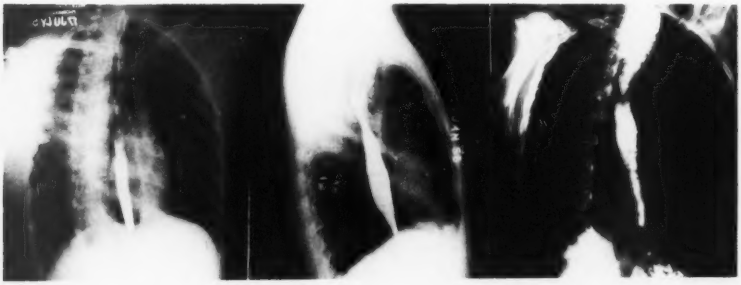

Figure 2. Over a 20-month period, significant progressive enlargement of the esophagus is seen.

Figure 3. On the left, retention of barium and esophageal dilatation are seen. Postoperatively, diameter and emptying time are normal.

Chemotherapy for his tuberculosis was successful, and he was discharged to duty. He returned several months later, with weight loss, vomiting, and progressive dysphagia. He stated that the mere thought of food was repulsive.

Surgery was performed in January 1959. The patient was eating a regular diet by the third day after surgery, left the hospital on the seventh day, and returned to full duty 2 weeks later. Figure 3 demonstrates the dramatic postoperative response. A communication from this soldier, received August 1959, reveals that he is experiencing no symptoms referable to his esophagus.

DISCUSSION

Most physicians believe that a majority of patients with achalasia can be treated successfully by dilation. This has not been our experience. The procedure is uncomfortable, to say the least, and even in an institution such as the Mayo Clinic, a 2-percent perforation rate is reported.[7] It is probably quite dangerous to attempt cardioesophageal dilation in a greatly enlarged, tortuous esophagus resulting from long-standing disease. While dilations may be palliative, a soldier will often be in a place where facilities of this nature are not available, and he will have to be evacuated through medical channels.

Cardioesophageal myotomy is not complicated and can be performed by any surgeon familiar with thoracic approaches. The important technical points are: (1) to make the myotomy long enough; (2) to start the myotomy well up on the esophagus where there is a definite cleavage plane between muscle and mucosa; (3) to separate muscle and mucosa bluntly with a Mixter clamp or similar instrument

prior to cutting, once the submucosal plane has been delineated; (4) to proceed with care in the gastric area, because the gastric mucosa is fragile and will perforate with ease; and (5) to be sure that all muscle fibers are split.

Reflux esophagitis, while not common, has been reported following the operation. To avoid this complication, any damage done to the diaphragmatic hiatus should be repaired. While this has not been reported in the literature, and has not been done by the present author, it would seem logical to place a stitch from the thoracic to abdominal side of the diaphragm, pick up the gastric musculature at the distal aspect of the myotomy, bring the suture back in a mattress fashion from abdominal to thoracic side of the diaphragm, and tie. In this manner, the obliquity of entrance of esophagus into stomach would be insured. This should tend to obviate reflux.

SUMMARY AND CONCLUSION

Achalasia is discussed from the standpoint of historical background, theories of causation, physiologic alterations, operative and nonoperative procedures, and the author's experience with cardioesophageal myotomy in 3 recent cases.

The operation of cardioesophageal myotomy effectively restores the esophagus to a functional state and is the operation of choice at present for achalasia. The operation is of particular value to those living in a military environment and should be undertaken before the irreversible changes of long-standing disease appear.

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The Implications of the Medical History of General Lee

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A FLEECE-LIKE FOG enveloped the Ohio River that early morning in March 1838 as the old paddle steamer puffed leisurely downstream toward the Mississippi, later to be named by President Lincoln as the "Father of Waters." Standing on the bow with his erect body silhouetted against the pearl-gray sky was First Lieutenant Robert E. Lee. An order from the United States Engineer Corps, dated April 6, 1837, assigned First Lieutenant Robert E. Lee to work on the channel of the Mississippi River at St. Louis. The river was washing out a new channel on the Illinois shore. The cutting of this channel was throwing up a bar opposite the town of St. Louis. The outcome of this river prank was all too serious to the populace of the town; its commerce was in danger of complete destruction. This was the problem to which the enterprising engineer, Lt. Lee, was assigned.

The day that the Lees arrived in St. Louis, Dr. William Beaumont took possession of the greater portion of the Clarke premises and remained there for a period of 18 months until October 31, 1839. It is likely that Lee and Beaumont met here for the first time, for Beaumont had refused to live in Jefferson barracks at St. Louis. For the month of May, 1838, the families of Clarke, Lee and Beaumont found themselves together in the Clarke mansion. In June the Clarkes moved and the Lees occupied the two rooms and portico that had been the home of Meriwether Clarke and his wife.

Here the Lees and the Beaumonts lived together for one year in complete harmony. The children playing together imagined themselves steamboats puffing along the Mississippi, and as Lt. Lee commented, "They played so hard I was fearful of the bursting of their

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From the Department of Pharmacology, University of Maryland School of Medicine, Baltimore, Maryland. First Walter Reed Lecture presented before the Section on History of Medicine, Richmond Academy of Medicine, February 10, 1959. Reprinted with permission from *Virginia Medical Monthly* 86: 306–310, June 1959.

boilers." Frequently, after a day of arduous toil on the Mississippi, the two families joined their thoughts in music. Beaumont's daughter, Sarah, played the piano. "Major Hitchcock, a frequent visitor, joined in on the flute and Lee, not dreaming of secession, turned the pages." Lee became very fond of the congenial Mrs. Beaumont and later in his letters to his friends in St. Louis always wanted to be remembered to the wife of the doctor as well as to his staunch friend, the doctor himself. The young engineer in these pleasant surroundings pushed forward his work on the harbor, which acquired for him an enviable reputation and a Captain's commission.

Prior to meeting Lt. Lee, William Beaumont had performed the experiments which were to immortalize him in the field of medicine, and this is how it happened. The report of the discharge of a gun was not an occasion for alarm at Mackinac; hunting was a recognized occupation. But on June 6, 1822, inadvertently a shot was fired, the report of which reverberated around the world and its echo was to be heard through more than a century of oncoming time. Alexis St. Martin, a youth of 19 years, was shot while standing adjacent to the barrel of a shotgun. The whole discharge, wadding and all, entered his body in the upper abdominal region. He fell, his shirt was burning—the prognosis of the bystanders was death. But destiny had carved a different course for St. Martin. Beaumont was called. In 20 minutes he was at the side of the moribund youth. His surgery was effective; his tonic of muriatic acid and wine was alleged to contribute strength and St. Martin recovered. After the cicatrization of his wound he was left with a gastric fistula, a human guinea pig.

Robert Edward Lee in dress uniform of a lieutenant of engineers. After a painting made about 1831 and credited to Benjamin West, Jr.

It was this unique test object which enabled Beaumont to study the fundamentals of the peptic digestion process. Beaumont, away from any laboratory of physiology, an army surgeon on the frontier of civilization, adequately described the basis of the process of protein digestion in the stomach. St. Martin's gastric juice secreted at Mackinac was sent to Franklin Bache,

grandson of Benjamin Franklin, at Philadelphia. It crossed the Atlantic and reached the great Swedish chemist, Berzelius, in Stockholm, and Professor Dunglison of the University of Virginia determined in it the presence of hydrochloric acid.

Lee's interesting friendship with Beaumont brought him personally in contact with one of the great characters of American medicine. Later he was to experience personal illness, which would bring him into the patient-doctor relationship with many other physicians. On April 25, 1853, Dr. Beaumont died. Thus death ended a friendship of 14 years, but for Lee a rapidly pyramiding series of events were bringing him with meteoric rapidity into national prominence. One of these events had medical significance.

In July 1849, Lee was engaged personally in the supervision of laying the huge stones which were to form the underwater foundation of Fort Carroll in the Patapsco River, the harbor of Baltimore. He experimented with the problem of laying concrete under water. Late in July, Lee developed malarial fever which became so severe that he was forced to return to his home in Arlington. Although he improved and was able to return to work, the illness still dogged him. Freeman records that this was his only recorded illness prior to 1863.

Although the nature of malaria and its transmission by the anopheles mosquito was not discovered until the turn of the century, it does appear that Lee was stricken with the *Plasmodium vivax*. This form of malaria is characterized by exacerbations when the individual is under stress, with concomitant lowered resistance, and in a hot climate suitable for the proliferation of the plasmodium. This was substantiated by the fact that the disease returned during the hard summer campaigns of Antietam and Gettysburg. Indeed it is possible that the *Plasmodium vivax* played a role in the outcome of these crucial battles and consequently in ultimate loss of war by the Confederacy. The records show that malaria was the most prevalent disease extant in the armies under the Stars and Bars.

Malaria is as old as the written pages of the history of mankind. The writer of the book of Deuteronomy states, "And the Lord will smite thee with a consumption and a fever and with an inflammation and an extreme burning." Nor was the disease new to military history in the Civil War. The vacillation of the Greeks before the walls of Troy was not due to their lack of military prowess but to the malaria which was rampant in their ranks. The soldiers of Hannibal, victims of the ubiquitous anopheles, dropped like mists before the sun in the pestilential regions surrounding Rome. In the Yorktown campaign, which was to close the Revolutionary War, General Washington had a formidable ally in the dashing young General

Lafayette. There was, however, another ally of Washington and his colonial troops. It was insidious, subtle, and unrelenting. Malaria was extant in ranks of the troops under Cornwallis. In World War I the ill-fated British Expeditionary Force to the Dardanelles was to encounter the omnipresent anopheles mosquito. Ninety-five thousand of the 115 thousand troops contracted malaria. It was here that the English lost that brilliant scientist, Moseley, who at 27 years of age had discovered the atomic numbers of the atoms of the elements. His death was a loss to all mankind.

Prior to World War II, quinine, the alkaloid isolated by Pelletier and Caventou in 1820, was the principal antimalarial drug. The Dutch-owned island of Java produced 95 percent of the world's supply of quinine. When the island fell into Japanese hands shortly after the attack on Pearl Harbor, our ability to combat malaria and sustain troops in the jungle could have been thwarted with the loss of this island. Atabrine, a product of German scientific ingenuity, was synthesized by American chemists and it became our principal antimalarial drug. The successful campaigns of the Pacific, North Africa, and Sicily would have been impossible without it.

Malaria still poses one of the world's greatest disease problems. Approximately 500 million people, about one-fifth of the world's population, suffer with this disease. The number of deaths each year is approximately 2 million. Science has met the problem adequately. Atabrine was followed by chloroquine and later by primaquine and Daraprim. These drugs, coupled with such insecticides as DDT, can eradicate the disease. But the eradication of this disease poses other problems. Where the incidence of the disease is greatest, the economic structure of the communities is lowest and the cost of medication and bulging population pressures militate against the conquest of man's unrelenting enemy, malaria.

The hard campaign of the battle of Antietam was over. The Army of Northern Virginia was quartered south of the Rappahannock during the dismal winter 1862–63. In the spring of 1863 Lee was eager to take the offensive again and carry the war into Maryland and Pennsylvania. At a crucial point in the planning of his campaign against the Union forces under Hooker, the fates conspired against the Confederacy and Lee became ill. This was his first illness as Commander of the Army of Northern Virginia.

The general had been suffering from insomnia. He contracted a severe throat infection which left him with severe pains in the arms and chest. Medical historians believe that these paroxysms were anginal in origin and secondary to a pericarditis. The severity of the illness necessitated his removal from the bleak quarters and that

he be placed under the care of Dr. Lafayette Guild. Guild was taken sick and Lee was placed under the care of Dr. S. M. Bemiss, a distinguished New Orleans physician who was serving as a surgeon with the Confederate forces.

Lee was in bed for several days. He stated, "They are tapping me all over like an old steam boiler before condemning it." After a week his symptoms ameliorated. He was left with what his medical advisers termed rheumatic twinges and weakness. It is probable the twinges were anginal in origin. This illness partially incapacitated him for almost a month. Back in action he faced the enemy at Chancellorsville, where he was to lose what Freeman called "his right arm," Stonewall Jackson.

In 1863 there were no specific anti-infective drugs. The incapacitating laryngitis could have been thwarted by the sulfonamides, or the antibiotics. This may have changed the course of the war. The pericarditis, had it developed, likewise would likely have yielded to massive antibiotic therapy. Although the disease, angina pectoris, with its classic symptoms had been described by Heberden in 1768, no specific drugs were available. It was not until 1867, 4 years after Chancellorsville, that the famous Scottish therapist, Sir Thomas Lauder Brunton, described the value of amyl nitrite in angiospastic disease and a decade later Murrell used glyceryl trinitrate in its treatment. Nearly a century later glyceryl trinitrate remains the drug of choice in angina pectoris. Its prompt dilation of the coronary vessels, relieving the cardiac hypoxia, has given it an enviable position in the therapy of angina which today remains unchallenged.

The problem of medical care in the Confederate Army was colossal. To illustrate:

The Confederacy had 600,000 men under arms. Of this number, 200,000 died of wounds or disease and it is estimated that the entire 600,000 were at one time or another under medical care for the treatment of disease or wounds.

Dr. William H. Taylor told of his experience in the treatment of the variety of ailments which the military surgeon encountered. He carried a ball of opium in one trouser pocket and a ball of blue mass in the other. He asked the question, "How are your bowels?" If open, he gave opium and if shut he gave blue mass.

Medical supplies were very limited. The most valued medicament was whiskey and apple brandy. Morphine was available in a limited amount only. It sold for $28 a dram, and quinine $22.25 an ounce. Chloroform was the anesthetic choice in the Confederate Army. Surgical mortality was extraordinarily high and abdominal wounds, penetrating a viscus, were almost invariably fatal.

The high-water mark of the Confederacy had been reached in charge of Pickett's brigade at Gettysburg. In the spring of 1864, Grant carried the war into Virginia to crush the Army of Northern Virginia and take the capital city of Richmond. Grant suffered 33,000 casualties in the Battle of the Wilderness and Lee's dauntless army lost 20,000 men. Lee concluded that Grant was poised to march on Richmond and invited attack in order to split the enemy's forces. At this critical point Lee was plagued with an acute intestinal ailment. He was forced to leave his tent and take treatment in a hospital house. As he lay prostrated by his illness he would often repeat, "We must strike them a blow." His temper flared at Colonel Venable as he attempted to direct the campaign from his bed. Lee partially regained his strength and rode with his old audacity with his troops in a carriage to Cold Harbor. Thus at a critical period of the Wilderness campaign Lee was nearly incapacitated for about 15 days with what has been called a severe intestinal ailment. General Ewell was simultaneously affected with the same type of illness.

The duration of the debilitating diarrhea which afflicted General Lee appears to rule out the possibility of an acute type of food poisoning. Rather, one is disposed to consider that the attack was one of bacillary dysentery or amebiasis. With the assumption that it was of bacterial origin, it is clear that the remedies of Lee's day would be of little avail. Calamus root, tannin-bearing herbs, and opium to check the diarrhea were the standard drugs of choice. The role of bacteria as a causative factor in childbed fever had only been discovered 14 years prior to the Battle of the Wilderness by Ignaz Semmelweis in Vienna.

Advances in this field have been marked. With one of the nonabsorbable sulfonamides, or a suitable antibiotic, Lee could have joined his troops astride Traveler in a few days.

One cannot rule out the possibility of amebiasis. The *Endamoeba histolytica* was not identified by Koch as the incriminating organism in this disease until 1883. Strides of great magnitude have also been made in this field. Emetine, the alkaloid of ipecac, has been joined with the arsenic-bismuth-bearing compound Milibis and the antibiotic Terramycin. Any of these drugs could have thwarted the disease within a period of 3 to 5 days. It is of interest that Napoleon suffered with amebiasis, when he was in exile on St. Helena.

From the Wilderness to Appomattox, General Lee appeared to suffer with no major illness. His letters, however, register complaints of muscle and joint pains, to which he referred as sciatica, lumbago, and rheumatism, on various occasions.

During the first few years of his presidency at Washington College

1865–68, Lee appeared to be in reasonably good health. However, his old enemies, rheumatism and angina pectoris, were simply lying in ambush waiting to strike their final blow. In October 1869, Lee had driven some members of his family for a ride in a carriage. Upon return the mare stumbled and fell in front of the house as if she were dead. Lee found that the animal was nearly choked by a tight collar. He rebuked himself severely and in emotional distress caressed the animal. Later, symptoms of chest pain developed along with a heavy cold. Doctors diagnosed his malady as a return of the pericarditis. The illness persisted and the general was of the opinion that his public life was about over. In March 1870, the college gave him a leave of absence to travel to warmer climates, which it was believed would be beneficial to his rheumatic condition. This was to be the final review.

Lee was hailed with praise and adulation as he visited many of the cities of the South. His soldiers came from far and near to pay homage to their peerless leader. At Augusta a young boy, 13 years of age, threaded his way through a crowd of soldiers and looked on the general with veneration. His name was Woodrow Wilson. This final parade of the great soldier was wearing and fraught with great emotion. In his letters he complained about the chest pain becoming unrelenting. He now experienced the pain while at rest in addition to following exertion. Lee stated his "complaint was fixed and old."

After returning to Lexington, Lee, following the advice of his physicians, set out for Baltimore to consult Dr. T. H. Buckler, who had gone to Paris after the end of the war and had returned to Baltimore. Baltimore was the site of Lee's first major illness, malaria, and it is ironical that he should have been sent there to seek advice in this last illness. The journey was exhausting for Lee. Buckler reported that his heart and lungs were "working well" although the heart was somewhat "diffuse." Lee was told that his principal difficulty stemmed from his rheumatic "constitution." He was advised to avoid exposure to cold, dress warmly, and drink lemon juice. That this rheumatic condition was the source of great distress to the general is evidenced by the fact that, in August 1870, he visited Hot Springs to take the "broiler" and "hot spout" treatment. Furthermore, his physician had applied the blister treatment to relieve his painful shoulder. The blistering plaster of cantharides as a powerful counterirritant was considered standard medical practice in Lee's time.

The late Dr. Lewellys F. Barker in his study of the medical records of General Lee was of the opinion that Lee suffered from arthritis in the shoulder joints and in the spine, in addition to his anginal pain. In this field of therapy it is clear that real advances have

been achieved. The wonder drug of the turn of the century was aspirin. It remains so today. It is likely that Lee could have lived more comfortably with less pain and more freedom of joint movement with a regimen of salicylate therapy. Furthermore, with the introduction of steroid therapy of the arthritides by Hench in 1949, cortisone, hydrocortisone, and later prednisone and Aristocort, have been made available in the treatment of arthritis. Almost overnight these substances have magically opened doors that led to a better understanding of the etiology and therapy of rheumatoid arthritis. At long last the "Great Crippler" with its distorted biochemical and physiologic balances is beginning to reveal itself and yield to these powerful and precise tools.

For General Lee the shadows were rapidly lengthening and the sun was fading beyond the western horizon. It was September 28, 1870. Lee's schedule for that day was routine college administration and a meeting of the vestry of Grace Church at 4:00 p.m. Eight years prior to this fateful day the Antietam campaign was completed and Lee wrote to President Davis, "History records but few examples of a greater amount of labor and fighting than have been done by this army during the present campaign." The day was rainy and chilly, the meeting room at the church was unheated. Lee presided over the vestry with a cape around him. Here Lee rendered his last service, away from the crackling sound of musket fire at Antietam, far from the glory of Chancellorsville; here under the great canopy of God he subscribed $55 to support the salary of Doctor Pendleton, the clergyman, who was one of his former lieutenants in arms. Returning home he collapsed at the dinner table in an attempt to offer thanks to God.

Lee probably suffered from a cerebral thrombosis, which was designated by his physicians as a "venous congestion." He rallied to a state of blurred consciousness. He took his medicine faithfully. The doctors applied cold dressings to his head and hot applications to his feet. They cupped him and gave him medicine, as Mrs. Lee recorded in a letter to her cousin. He slept much and talked very little. On October 8 he stated to his physician slowly and distinctly, "I . . . feel . . . better." In spite of the hopeful spirits of his doctors and his former comrades in arms, life was ebbing fast away and he sensed it. On October 12 at 9:15 a.m., Grant was likely sitting comfortably in the White House at breakfast, Lee was unconscious. Perhaps through his ischemic brain again soared the thoughts of Malvern Hill, or the Wilderness and the forward movements of the Army of Northern Virginia. Clearly he exclaimed, "Strike the tent!" and the disease process which began at Chancellorsville now claimed

him at Lexington. It is likely that the old actor, arteriosclerosis, famed for his multiplicity of roles, came finally upon the stage to end the act and draw the curtain. And Lee then had broken the barrier of time and now belonged to the ages: magnificent, majestic, and dauntless to the end.

Lithograph by Currier & Ives

The deathbed of Robert E. Lee.

The implications of medical history of General Lee in the retrospect of almost a century point clearly to two salient facts. First, in the physical ailments with which the general was associated or personally afflicted tremendous strides have been made. One might reiterate—peptic ulcer and his association with William Beaumont, malaria, septic sore throat, pericarditis, angina pectoris, and arthritis. And indeed our knowledge of the arteriosclerotic processes is at long last being unravelled. Second, in the moral and emotional forces of man's life there appears to be little or no progress in the century which has passed since the War Between the States. Pride, rapaciousness, selfishness, and greed, the precursors of war, still are rampant among the nations. The glory has been removed from war, but additional horror has been substituted for it. If Lee could return, I feel that his clarion message for all mankind would be that which echoed through the Galilean hills 2,000 years ago, "Blessed are the peacemakers for they shall be called the children of God."

Case Reports

Implantation of Intestinal Cancer Following Colotomy, Coloscopy, and Colon Resection

MAJOR HAROLD W. MUELLER, MC, USA
COLONEL JAMES E. GRAHAM, MC, USA
COLONEL EDWIN J. PULASKI, MC, USA

THE PRIMARY REASON for performing colotomy and coloscopy is to make a therapeutic decision at the time of operation. We wish to call attention to an observation that suggests that this may not be an entirely innocuous procedure. In the patient with carcinoma undiagnosed preoperatively, and associated with multiple polyps of the colon, surgical manipulation may predispose to cancer implantation, and the hazard may be increased by colotomy and coloscopy.

CASE REPORT

A 64-year-old white woman applied for treatment at this hospital because of blood in the stools for several days. During the previous 6 months she had had painless "loose" stools with no weight loss. Examination in the proctology clinic revealed numerous rectal polyps, several of which were removed; the pathologist returned a report of benign adenomatous polyps. Barium enema and air contrast studies demonstrated multiple additional polyps in the sigmoid and in the transverse colon near the splenic flexure.

The patient had had a cardiovascular accident 5 years prior to this admission and had been under observation and treatment intermittently for hypertension. Blood pressure was 195/95 mm Hg and there was a systolic murmur radiating to the neck. Except for a well-healed lower midline abdominal scar (hysterectomy), physical examination was otherwise essentially negative.

Following careful preparation of the bowel, exploratory laparotomy was performed. Polyps were palpated to the left of the midtransverse colon, but not at the splenic flexure or descending colon. A midtransverse colotomy was performed, and a sigmoidoscope inserted. The right colon and cecum seemed to be free of disease although particulate matter in the bowel did not afford completely satisfactory examination. The sigmoidoscope was then directed to the left, revealing two large polypoid masses within 6 cm of the colotomy incision. The left colon and sigmoid were resected and primary anastomosis to the rectum

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at the level of the peritoneal reflection was planned. The pathologist present opened the bowel and reported small polyps extending up to the line of the transverse colon. Right colectomy and ileoproctoscopy were performed. Small diffuse polypi extending to the cecum were revealed in the right colon, one of them ulcerated and suggesting malignant change.

Histologic examination of the entire colon revealed (a) carcinoma in situ in a pedunculated polyp in the descending colon, and (b) adenocarcinoma in the ulcerated lesion of the right colon with extension to the serosa and lymphatics.

The patient had an uncomplicated postoperative course. During the next 6 months she continued to enjoy good health. Five remaining polyps were removed from the rectum at monthly follow-up visits.

Approximately 8 months postoperatively, the patient expired at home while asleep. At postmortem examination the cause of death was attributed to progressive coronary atherosclerosis and myocardial fibrosis and fatty infiltration.

On examination of the peritoneal cavity the parietal peritoneum and the surfaces of the liver and ovaries showed diffuse, finely nodular infiltrations, which on histologic examination were found to be metastases of neoplastic cells arranged in acinar form. The serosa of the small bowel was also peppered with minute, firm, milk-white nodules which did not invade the wall. The site of the ileorectostomy contained many nodules, some invading the muscularis, and the mucosal surface revealed similar plaques. All plaques showed neoplastic cells. No deep invasion into lymphatics or liver was noted.

COMMENT

The use of colotomy and coloscopy was first considered by Monks in 1903,[1] just 8 years after Kelly introduced the proctoscope and Röntgen discovered what he termed the x-ray.[2] The standard proctoscope and roentgenogram have been invaluable aids in diagnosis of large bowel polyps, as has the proctoscope in the treatment of those within its reach. Monk states: "It is, of course, uncertain to what extent the shock and danger of infection in connection with such a procedure [colotomy and coloscopy] would prevent its use." [1] This has proved not to be a shocking procedure and the careful preoperative preparation of the bowel has reduced the danger of infection to a minimum. Radiographic methods have proved to be only 50 percent accurate in detecting polyps less than 1 cm in diameter,[4–6] and unsuspected carcinoma has been found in one fourth of patients examined.[4,7]

We are postulating that colotomy and coloscopy in those patients with an unsuspected carcinoma is a potentially hazardous procedure. In anterior resections of the bowel, whenever carcinoma recurs at the suture line, it is presumably because tumor cells were implanted into the bowel wall by the surgeon's needle.[1,3,6,8–11] Manipulation of the colon results in desquamation of numerous cells from the primary site;[8,11,12] these cells can be found lying free in the lumen. Such

exfoliation of cells always appears to be more copious in pathologic conditions, particularly in both benign and malignant neoplasms.[13, 14] There is, however, some doubt as to whether these cells usually survive and proliferate.[6] Some believe that they will grow on raw surfaces [8, 9] and ulcerated areas, and others believe that they may even become implanted on normal mucosa, peritoneum, or elsewhere. In any case, it would seem that colotomy and coloscopy may, by inducing further desquamation of malignant cells, increase the hazard of surgical manipulation.

SUMMARY AND CONCLUSION

A case is presented of unsuspected carcinoma of the ascending colon associated with multiple polyps, diagnosed at exploratory laparotomy. At autopsy 8 months following colotomy, coloscopy, resection, and ileorectostomy, recurrent tumor was found at the anastomotic site, and the parietal and visceral peritoneal surfaces were peppered with minute nodules of metastatic tumor.

In the light of the postmortem findings in this patient, we postulate that the local recurrence of carcinoma at the anastomotic site was the result of implantation of tumor cells by the surgeon's needle. We further suggest that the scattered tiny implants on the small bowel, liver, ovaries, and parietal peritoneum may have been implantation metastases from the colotomy and coloscopy, although they might also have arisen from either the original or recurrent tumor or as the result of surgical manipulation alone. It would seem to us that in cases of multiple polyposis in which unsuspected carcinoma develops, colotomy and coloscopy should be considered potentially hazardous procedures.

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Ependymoma of the Conus Medullaris

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IN JANUARY 1958 Ayres [1] reported 18 cases of intradural, extramedullary ependymoma located in the region of the cauda equina, filum terminale, or conus medullaris and collected 89 cases previously reported in the world literature. In the subsequent literature we have been able to find 1 additional case—that cited by Mendelsohn and Mora.[2]

Ependymomas occur chiefly in children and young adults. The average age of the patients discussed by Mabon and associates [3] was 23.4 years. Of the 200 gliomas of the spinal cord and filum terminale studied at the Armed Forces Institute of Pathology, 117 were ependymomas.[4] On the basis of architectural pattern these tumors have been divided into 3 categories: (1) epithelial, in which ependymal

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cells form glandlike spaces mimicking the central canal of the spinal cord; (2) papillary or myxopapillary, in which there are more or less typical papillary projections in the tumor and myxomatous degeneration of the connective tissue stroma; and (3) cellular, which lack the epithelial or papillary arrangement but disclose ependymal cells frequently oriented around blood vessels and anchored to their walls through numerous fibrillary processes. Grading of the ependymomas into 4 groups (grade 1 through grade 4) according to the degree of cellular pleomorphism and anaplasia is sometimes believed to be a better index of prognosis than the general architectural type of the lesion in question. In Mabon's series [3] the number of patients living 3 years after surgical intervention varied from 9.1 percent in tumors of grade 4 to 79.3 percent in the better differentiated lesions of grade 1.

CASE REPORT

A 29-year-old white man was transferred to this hospital from another Naval medical facility on 14 March 1959 with a history of recurrent low back pain of 13 months' duration. He had had coccygeal and deep pelvic pain for 2 or 3 days in February 1958 after he had slipped and fallen on ice. Similar pain was present for 2 weeks in March 1958 after he twisted his back when he slipped in a shower. Later that month the back pain became more severe while he was pushing a truck, and he had headache for a few hours. By the end of March symptoms had entirely subsided. During the months of June, July, and August, he had 3 episodes of lumbosacral, coccygeal and deep pelvic pain, lasting 4 to 7 days each. Back pain recurred in October 1958 and for the first time he consulted a medical officer. Examination of the back and nervous system was reported as being within normal limits. At this time the patient first noticed that motion of his head and moving his legs in certain positions aggravated the pain. He also noticed that the pain was less severe when he stood than when he reclined. A tentative diagnosis of inflammatory disease of the neural coverings was made and prednisone, 5 mg every 8 hours, was started. There was dramatic relief of pain within 16 hours. Steroid therapy was continued for a period of 2 weeks, during which time the patient remained asymptomatic.

The next bout of back pain occurred in December 1958, this time with radiation into the right gluteal region and down the posterior aspect of the right thigh. Physical examination was reported as being within normal limits. Discomfort subsided over a period of 2 weeks. In early February 1959, symptoms recurred, this time more severe than ever. The patient was given another course of prednisone therapy empirically over a period of 3 weeks and again there was immediate and complete relief of pain. On 10 March lumbosacral, coccygeal, deep pelvic, and gluteal pain reappeared. Neurologic examination was reported as revealing the right knee jerk to be slightly more active than the left, diminished Achilles reflex bilaterally, and no response to plantar stimulation on the left but extensor Babinski response on the right. Steroids produced only partial relief of pain. On 13 March a lumbar puncture was performed. The spinal fluid was xanthochromic and coagulated on standing. Cell count was 184 red blood cells

per cu mm with no white blood cells. Proteins were 2,310 mg per 100 ml. Initial spinal fluid pressure was 140 mm of water and final pressure 100 mm. Queckenstedt's test was not performed. The patient had had no urinary dysfunction, although there had been minor difficulty with bowel control. There had been no recurrence of headache.

Figure 1. Myelogram showing complete block at level of first and second lumbar interspace.

At the time of the patient's admission to this hospital his pain was only partially controlled by narcotics. The recumbent position aggravated the symptoms and he slept sitting up. On examination he stood with his back held in rigid extension and percussion of the entire spine from the cervical region inferiorly produced pain in the upper sacral area. Head flexion and rotation produced the same pain. Flexion of the back was 50 percent restricted and there was bilateral paravertebral muscle spasm in the lumbar area. Straight leg raising was limited to 30° bilaterally, with accentuation of pain on dorsiflexion of the ankles. Neurologic examination showed no definite motor weakness in the lower extremities

although there was subjective triceps surae weakness on the right. The right ankle jerk was slightly depressed and there was unsustained ankle clonus on the left. The Babinski response was extensor on the right and flexor on the left. There was hypesthesia and hypalgesia of the saddle area on the right. Vibratory and position senses were intact. The anal sphincter was patulous. Roentgenographic examination of the lumbosacral spine and pelvis revealed no abnormalties. Complete blood count and urinalysis were within normal limits.

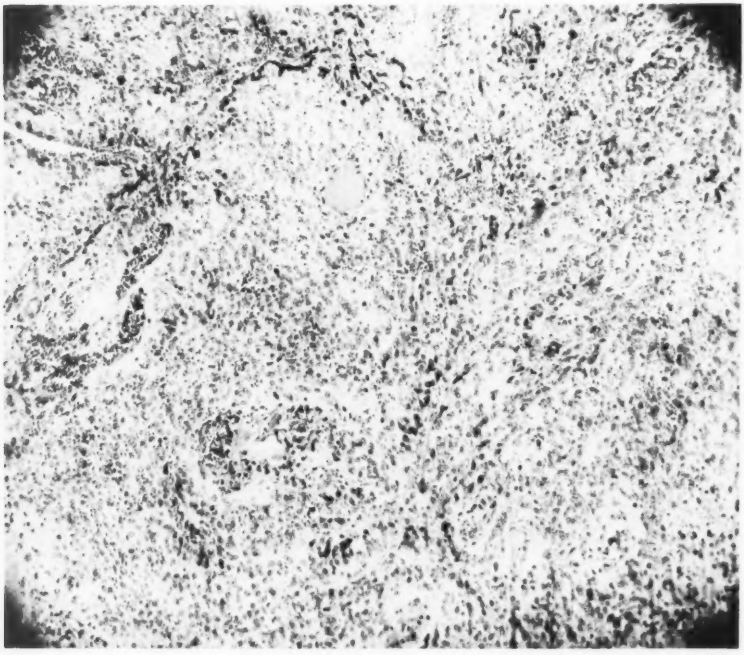

Figure 2. Photomicrograph of tumor, showing cells with round or oval vesicular nuclei and indistinct cell borders, frequently arranged in orderly fashion around the walls of blood vessels. Anchorage of fibrillary processes to the vessel wall is not apparent at this magnification. (x 100)

On 23 March myelography was performed, the needle being introduced between the third and fourth lumbar vertebrae. The spinal fluid was xanthochromic and clotted quickly. Initial pressure was 120 mm of water, with slow rise on jugular compression to 170 mm, and a very slow fall to 130 mm of water. Six cc of Pantopaque was introduced and a complete block was demonstrated at the level of the first and second lumbar intervertebral space (fig. 1). Reports of laboratory studies of the spinal fluid were as follows: proteins 3.72 grams per 100 ml, red blood cells 1,298 per cu mm, no white blood cells. On 25 March the patient underwent complete laminectomy of the twelfth thoracic and first lumbar

vertebrae, except for the lateral rims, and partial laminectomy of the eleventh thoracic and second lumbar vertebrae. The dura was found to be tense and had a bluish tint. On opening the meninges a soft purple extramedullary tumor mass, 10 cm long and 3 cm wide, was found overlying the conus medullaris. The mass was covered with a thin capsule and there was no pedicle. As the tumor was being removed the thin capsule ruptured and it was necessary to remove the mass, which was quite vascular, by pituitary spoon and suction. After removal of the tumor, the conus medullaris was seen to be flattened from compression.

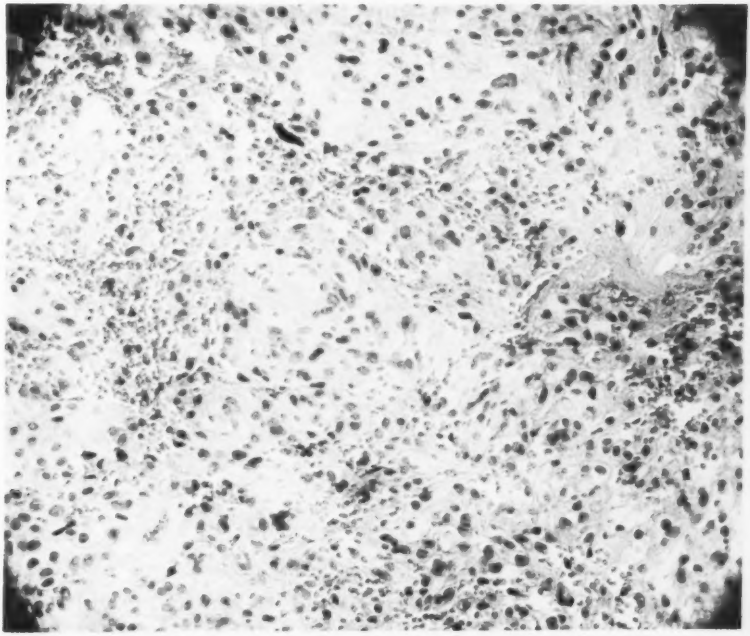

Figure 3. At higher magnification the fibrillary process of the tumor cells can frequently be made out. (x 200)

The patient's postoperative course was uncomplicated and he became ambulatory 7 days after operation. At the time of his discharge from the hospital on 9 April 1959 he was able to walk without difficulty, although he continued to hold his back in extension and exhibited bilateral erector spinae tightness. Rectal sphincter tone was improving, as was sensation in the saddle area on the right. There was no motor weakness in the lower extremities. The right ankle jerk remained depressed. A lumbar puncture was repeated on 12 May 1959 and spinal fluid studies were recorded as follows: lymphocytes 3, no red blood cells, proteins 386 mg per 100 ml.

The patient was re-examined at this hospital on 11 June 1959 and at that time was completely free of pain. He had no bowel or bladder difficulties, no head-

aches, and no discomfort on neck motion. On examination no tenderness was elicited over the spine and there was no muscle weakness, atrophy, or spasm. Back motion was neither restricted nor painful, and straight leg raising was possible to 80° bilaterally. Hypesthesia over the right saddle area was no longer present. The right ankle jerk remained slightly depressed. Rectal examination showed some diminution in sphincter tone. Spinal puncture performed between the third and fourth lumbar vertebrae yielded very slightly xanthochromic fluid. Initial pressure was 152 mm of water and jugular compression produced prompt rise to 300 mm; on release there was rapid fall to 170 mm of water. Laboratory findings were as follows: red blood cells 91 and white blood cells 12 per cu mm, with 5 neutrophils and 7 lymphocytes, proteins 240 mg per 100 ml.

Pathologic examination. The specimen submitted to the laboratory consisted of numerous pieces of tissue not exceeding 1.5 cm in longest dimension, most of them hemorrhagic and friable but a few firmer and of pale tan color. Microscopically the neoplasm was composed of dense collections of cells with oval, elliptical, or round nuclei, indistinct cytoplasm, and many fibrillary processes. Blood vessels were numerous and the tumor cells were frequently seen oriented circumferentially around these vascular channels, attached to the walls of the latter through their fibrillary processes (figs. 2, 3). Cajal's gold chloride stain for astrocytes and Mallory's phosphotungstic acid-hematoxylin stain for glial fibers were negative. There was little pleomorphism of the tumor cells, although some nuclei were large and an occasional one was hyperchromatic. Mitoses were absent. The endothelial cells lining the vascular spaces were not unusually prominent, and no areas of necrosis were observed. Cells resembling or actually representing oligodendroglia, which have been described in as many as 30 percent of ependymomas,[4] were not seen in numerous sections examined. The tumor was classified as a cellular ependymoma, grade 2.

SUMMARY

A case of grade 2 cellular ependymoma of the conus medullaris is presented. Prior to surgical excision of the tumor the patient experienced prompt and dramatic remission of pain while receiving steroids orally. It is our theory that pain relief resulted from suppression of irritation or inflammation of the arachnoid by red blood cells dialysed through the thin membrane of the ependymoma into the spinal fluid.

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Military Medical News

Colonel Benford Announces Retirement

Colonel Robert J. Benford, USAF, MC, editor of the *U.S. Armed Forces Medical Journal*, has announced his retirement from the Air Force, effective 1 March 1960, after 22 years of military service. Colonel Benford has been associated with the *Journal* since its first year, except for a 2-year period as assistant for professional services to the Assistant Secretary of Defense (Health and Medical). As associate editor and later as editor, he has become closely identified with the *Journal*. His immense drive, intensity of purpose and vigor, his deep involvement in the mission of this publication, and his unfaltering efforts to improve the quality of his product have left ineradicable imprints on *Journal* content and form. As physician, as military surgeon, and as journalist, Colonel Benford possesses qualifications that have made him eminently, perhaps uniquely, equipped to direct the *Journal*'s activities.

Colonel Benford

With this varied background and training and endowed with a natural flair for the potency of the written word, Colonel Benford has guided the *Journal* with a sure hand through waters that have not been completely unruffled. His standards of accomplishment are high and he has had a constant vision of an ideal military medical publication toward which his energies have been indefatigably directed. The impressive new design of the *Journal* is only the overt manifestation of the success of his endeavor: no mere veneer, it garnishes a composition continuously achieving higher levels in subject matter, scientific accuracy, and style. The editor has communicated his enthusiasm to his staff, and imbued them with enough

of his own steam to keep them for some time on the steady course he has set.

The editorial board and the *Journal* staff take this opportunity to express their deep regret at his departure, their sincere appreciation of his dedication to his task, and their heartfelt wishes for his success in future ventures.

Walson Hospital Dedicated

The new 500-bed hospital to be dedicated this month at Fort Dix, N.J., will be named for the late Brigadier General Charles M. Walson, MC, USA, first Army Surgeon prior to his retirement in 1947, and later administrator of the American Red Cross Blood Bank program for the Greater New York area. General Walson died 14 May 1959.

ARMY ADVISORS. The Advisory Council on Reserve Affairs to the Army Surgeon General held its annual meeting in Washington, D.C. on 21–22 November 1959. The members of the council, consultants who advise on reserve activities which effect the nation's health professions are, with one exception, brigadier generals in the Medical Corps Reserve of the Army: first row, left to right, Harold G. Scheie, Alexander Marble, chairman, Frank E. Wilson, and Harold C. Lueth; second row, Manfred U. Prescott, Truman G. Blocker, Jr., Carl S. Junkermann, and Joseph M. Bosworth; and third row, James H. Kidder, David E. Mayer, and Brigadier General Thomas P. Fox, DC, USAR.

Flickinger Wins Jeffries Award

Brigadier General Don D. Flickinger, USAF, MC, surgeon, assistant deputy commander for research and assistant for bioastronautics, Headquarters Air Research and Development Command, became the nineteenth recipient of the John Jeffries Award of the Institute of Aeronautical Sciences at the society's annual meeting in January. Given for outstanding contributions to the advancement of aeronautics through medical research, the award is traditionally won by a member of the Aerospace Medical Association. Dr. Hubertus Strughold, advisor for research and professor of space medicine at the U.S. Air Force School of Aviation Medicine, received the 1958 award. General Flickinger received his medical degree from Stanford University School of Medicine in 1933, and entered the Army as a first lieutenant in 1934 transferring to the Air Force in 1949.

Officers Certified By Specialty Boards

The surgeons general of the military medical services have announced that the following regular Medical Corps officers have been certified by the specialty boards indicated.

American Board of Obstetrics and Gynecology

Watson, Arthur C., Jr., Maj., USAF

American Board of Neurological Surgery

Brannon, Leland C., Comdr., USN

American Board of Plastic Surgery

Starzynski, Thaddeus E., Comdr., USN

American Board of Surgery

Sarver, Richard B., Comdr., USN

Official Decorations

The following awards were recently announced by the Departments of the Army and Air Force.

Soldiers Medal

Roger G. Thorpe, Capt., USAF, MC

Army Commendation Ribbon With Medal Pendant

John A. Deakins, Capt., MSC, USA
Edward Marks, Lt. Col., MSC, USA
Thomas J. Whelan, Jr., Lt. Col., MC, USA

Air Force Commendation Ribbon

William F. Kiser, Jr., Capt., AFRes, MC

Deaths

AMBROSE, ANNA ANTONINA, Lieutenant Commander, NC, USNR, of Homestead, Pennsylvania; assigned to U.S. Naval Hospital, San Diego, California; graduated in 1933 from Shadyside Hospital School of Nursing, Pittsburgh, Pennsylvania; appointed an ensign in the United States Naval Reserve 14 May 1942; reported for active duty 22 September 1942; released from active duty 14 February 1946; recalled to active duty 9 April 1951; died 24 November 1959, aged 50, at U.S. Naval Hospital, San Diego, of carcinoma of the breast.

GEMALY, TELLADUSHA, Second Lieutenant, NC, USAR, of Boston, Massachusetts; assigned to U.S. Army Hospital, Fort Hood, Texas; graduated in 1958 from Boston College, School of Nursing; appointed a second lieutenant in the Army of the United States 2 January 1959; reported for active duty 19 January 1959; died 23 November 1959, aged 29, near New

Braunfels, Texas, of injuries incurred in an automobile accident.

LEWIS, JAMES EDWARD, Lieutenant Colonel, MC, USA, of Pittsburgh, Pennsylvania; assigned as medical advisor to the Joint U.S. Military Mission Aid to Turkey, in Ankara; graduated in 1941 from the University of Pittsburgh School of Medicine; appointed as a first lieutenant in the Army of the United States 11 June 1941; reported for active duty 1 August 1942; relieved from active duty 23 March 1946; recalled to active duty 7 April 1950; commissioned as a captain in the United States Army 24 April 1950; died 5 December 1959, aged 43, at Walter Reed Army Hospital, Washington, D.C., as a result of injuries incurred in an automobile accident in Turkey, in September.

REGNER, MATHIAS FREDERICK, Colonel, USAF, MC, of Eau Claire, Wisconsin; assigned to 7112th Central Medical Group, Wiesbaden, Germany; graduated in 1937 from University of Wisconsin Medical School, Madison; appointed as a first lieutenant in the Army of the United States 7 December 1937; reported for active duty 5 November 1940; commissioned as a lieutenant colonel in the United States Air Force 11 March 1949; died 20 November 1959, aged 56, at Wiesbaden, of atherosclerotic occlusion and myocardial infarction.

JCAP OFFICERS CHOSEN. At the annual business meeting of the Joint Committee on Aviation Pathology held 6 November 1959 in Washington, D.C., Colonel Joe M. Blumberg, MC, USA, left, deputy director of the Armed Forces Institute of Pathology, was chosen to succeed Captain Carl E. Wilbur, MC, USN, as chairman, and Major F. Warren Lovell, USAF, MC, right, Aerospace Pathology Branch ,was named secretary, succeeding Captain Murray E. Ballenger, MC, USN. The Committee, established in 1955 by the Department of Defense, is composed of representatives from the armed forces of the United Kingdom, Canada, and the United States.

Fairbank Medal Awarded

Brigadier General Leigh C. Fairbank, DC, USA (Ret.), first dental corps officer to attain general rank, made the initial presentation of a medal bearing his name at Brooke Army Medical Center, on 18 December. The medal and accompanying certificate, awarded to encourage young dental officers to participate in field medical service training, was presented to the dental officer with the highest scholastic standing in the Army Medical Service School's advanced officers' course, Major Kenneth W. Thomasson, DC, USA, now stationed at Fort Bragg, North Carolina.

Hospital Suggests Guide in Use of Antibiotics

The Medical Board of St. Luke's Hospital, New York City, recently approved the following recommendation of the hospital's committee on management of communicable diseases, and it is published with the permission of William S. Norton, II, M.D., secretary of the board:

A recent study of the resistance of 112 cultures of coagulase-positive *Staphylococcus aureus* reveals the resistance and sensitivity pattern to various antibiotics shown in the table.

Resistance to various antibiotics of penicillin-resistant (87%) and penicillin-sensitive (13%) organisms

Antibiotic	*Pencillin-resistant organisms (percentage of resistance)*	*Pencillin-sensitive organisms (percentage of resistance)*
Streptomycin	100	0
Terramycin	48	14
Achromycin	46	0
Aureomycin	36	0
Erythromycin	23	20
Chloromycetin	20	7
Novobiocin (Albamycin) (Cathomycin)	4	0
Kanamycin	0-2	0
Spontin	0-2	0
Vancomycin	0-2	0

After consideration of the above study, the Committee makes the following recommendations regarding the use of antibiotics:

1. That no tetracyclines (Achromycin, Aureomycin, or Terramycin) be used in the hospital on inpatients or outpatients for any infection unless bacteriologic sensitivity studies indicate that a tetracycline is the antibiotic of choice.

2. That novobiocin (Cathomycin or Albamycin) be reserved exclusively for severe established staphylococcus infections and that it be administered exclusively by the intravenous route.

3. That Dicrysticin (penicillin with streptomycin) be restricted to established enterococcus and/or *Streptococcus viridans* infections in which this combination is specifically indicated.

This should not be interpreted as a rule or an order, but insofar as possible the suggestions should be seriously considered in treatment of patients.

The Medical Officer Writes

Articles Published in Other Journals

U.S. Army

MASS OTOLOGIC SCREENING. Major James P. Albrite, MC, USA, F. Thomas Galloway, M.A., and R. Edwin Shutts, Ph.D., Walter Reed Army Hospital. *Medical Annals of the District of Columbia*, September 1959.

IGNORANCE OR OPPORTUNITY—THE PEDIATRIC RESIDENT AND ADOLESCENT MEDICINE. Major Frederick C. Biehusen, MC, USA, and Captain Leon M. Hebertson, MC, USA, Letterman Army Hospital, San Francisco, Calif. *The New Physician*, November 1959.

COMPARISON OF TUBE DILUTION AND DISC (AGAR DIFFUSION) METHODS FOR TESTING MICROBIAL SUSCEPTIBILITY TO ANTIBIOTICS. First Lieutenant Kenneth A. Borchardt, MSC, USA, and David H. Andrews, Fitzsimons Army Hospital, Denver, Colo. *Antibiotics and Chemotherapy*, October 1959.

GENITOURINARY TUBERCULOSIS. Major Anthony A. Borski, MC, USA, Fitzsimons Army Hospital, Denver, Colo. *Rocky Mountain Medical Journal*, October 1959.

MEPROBAMATE TOXICITY. Major Gordon W. Briggs, MC, USA, 98th General Hospital, Neubrucke, Germany. *Medical Bulletin of the U.S. Army, Europe*, July 1959.

A CASE OF COCCIDIOIDAL MENINGITIS ARRESTED BY PROLONGED THERAPY WITH INTRAVENOUS AMPHOTERICIN B. Captain John J. Castellot, MC, USA, Major Forrest W. Pitts, MC, USA, and Colonel Fred H. Mowrey, MC, USA, Letterman Army Hospital, San Francisco, Calif. *Antibiotic Medicine*, August 1959.

HEPATIC CIRRHOSIS DUE TO SARCOIDOSIS. Captain Melvin D. Cheitlin, MC, USA, and Colonel B. H. Sullivan, Jr., MC, USA, Walter Reed Army Hospital. *Medical Annals of the District of Columbia*, September 1959.

MISUSE OF BLOOD TRANSFUSION. Lieutenant Colonel William H. Crosby, MC, USA, Walter Reed Army Institute of Research. *Postgraduate Medicine*, November 1959.

PLASTIC EMBEDDING OF UNDECALCIFIED BONE. G. L. Dowding, B.A., Armed Forces Institute of Pathology. *American Journal of Clinical Pathology*, September 1959.

SPECIFIC PROPHYLAXIS OF TETANUS. Geoffrey Edsall, M.D., Walter Reed Army Institute of Research. *Journal of the American Medical Association*, 26 September 1959.

THE WANDERING CLOT. Captain Michael R. Ferrell, MC, USA, 98th General Hospital, Neubrucke, Germany. *Medical Bulletin of the U.S. Army, Europe*, July 1959.

EXOGENOUS INTRAOCULAR FUNGUS INFECTIONS. B. S. Fine, M.D., and L. E. Zimmerman, M.D., Armed Forces Institute of Pathology, Washington, D.C. *American Journal of Ophthalmology*, August 1959.

Titles of articles in current periodicals written by commissioned officers and civilian scientists in the medical services of the Department of Defense will be published each month insofar as space permits. This listing is gleaned from available periodicals and is not necessarily complete. Authors desiring inclusion of published articles are invited to send a reprint to the *Journal*.—EDITOR.

PIGMENTED NEVI. Major William C. Fisher, MC, USA, 2d General Hospital, Landstuhl, Germany. *Medical Bulletin of the U.S. Army, Europe*, September 1959.

SPINDLE-CELL SQUAMOUS CARCINOMA OF THE LIP. G. W. Greene, Jr., D.D.S., and Colonel J. L. Bernier, DC, USA, Armed Forces Institute of Pathology, Washington D.C. *Oral Surgery*, August 1959.

SARCOMA BOTRYOIDES (EMBRYONAL RHABDOMYOSARCOMA) OF THE ANUS. W. C. Sharp, Jr., M.D., and E. B. Helwig, M.D., Armed Forces Institute of Pathology, Washington, D.C. *A.M.A. Journal of Diseases of Children*, June 1959.

U.S. Navy

THRESHOLD OF AURAL PAIN IN HIGH INTENSITY SOUND. Harlow W. Ades, Ph.D., S. N. Morrill, A.B., Captain Ashton Graybiel, MC, USN, and G. C. Tolhurst, Ph.D., U.S. Naval School of Aviation Medicine, Pensacola, Fla. *Aerospace Medicine*, September 1959.

BLEEDING DUODENAL ULCER, STUDY OF ONE HUNDRED SIXTY-TWO PATIENTS, WITH PARTICULAR REFERENCE TO PAIN, SEASONAL INCIDENCE, AND BLOOD GROUPS. Lieutenant Martin Bandler, MC, USNR, and Lieutenant Jay A. Desjardins, MC, USN, U.S. Naval Hospital, Philadelphia, Pa. *Journal of the American Medical Association*, 29 August 1959.

THE OCCURRENCE OF FAILURES IN PENICILLIN-TREATED GONORRHEAL URETHRITIS. Michael F. Barile, 406th Medical General Laboratory, Camp Zama, Japan, Lieutenant Gene K. Van Zee, MC, USNR, and Reizo Yaguchi, U.S. Naval Air Station Hospital, Atzugi, Japan. *Antibiotic Medicine*, August 1959.

SPONTANEOUS REGRESSION OF CARCINOMA OF THE CERVIX. Captain Paul E. Black, MC, USN, U.S. Naval Air Station, Brunswick, Maine, and Ethan Allan Brown, M.D. *Journal of the Maine Medical Association*, October 1959.

OCCUPATIONAL HEALTH PROBLEMS IN SPACE FLIGHT AS EXPERIENCED WITH NUCLEAR POWER PLANTS. Lieutenant Commander John H. Ebersole, MC, USN, U.S. Naval Hospital, Bethesda, Maryland. *Military Medicine*, October 1959.

ELECTROPHORESIS OF SALIVA. J. H. Geller, Lieutenant Lawrence Hames, DC, USNR, and Commander Gordon H. Rovelstad, DC, USN. U.S. Naval Training Center, Bainbridge, Maryland. *Journal of Dental Research*, September–October 1959.

ACUTE BENIGN PERICARDITIS AND THE COXSACKIE VIRUSES. Lieutenant Robert L. Gillett, MC, USNR, U.S. Naval Hospital, Jacksonville, Fla. *New England Journal of Medicine*, 22 October 1959. Condensed in *Modern Medicine*, 15 October 1959.

DYNAMIC VISUAL ACUITY IN AN APPLIED SETTING. Lieutenant (j.g.) James E. Goodson, MSC, USNR, and James W. Miller, Ph.D., U.S. Naval School of Aviation Medicine, Pensacola, Fla. *Aerospace Medicine*, October 1959.

COUNTERROLLING OF THE EYES AND ITS DEPENDENCE ON THE MAGNITUDE OF GRAVITATIONAL OR INERTIAL FORCE ACTING LATERALLY ON THE BODY. R. C. Woellner, and Captain A. Graybiel, MC, USN, U.S. Naval School of Aviation Medicine, U.S. Naval Aviation Medical Center, Pensacola, Fla. *Journal of Applied Physiology*, July 1959.

HEALTH IN AMERICA'S FUTURE, THE ROLE OF MEDICAL RESEARCH IN THE UNITED STATES NAVY. Rear Admiral Bartholomew W. Hogan, MC, USN, Surgeon General, U.S. Navy. *Life and Health*, 8 October 1959.

Washington, III

THE EFFECT OF BOREDOM ON SUGGESTIBILITY. Marshall B. Jones, Ph. D., and Lieutenant (j.g.) James E. Goodson, MSC, USNR, U.S. Naval School of Aviation Medicine, Pensacola, Fla. *Aerospace Medicine*, October 1959.

THE EFFECT OF HEAT TREATMENT VARIABLES ON THE MICROSTRUCTURE AND HARDNESS OF A CAST DENTAL GOLD ALLOY. Captain Anthony K. Kaires, DC, USN, U.S. Naval Station, Sangley Point, P.I., and Joseph C. Thompson, U.S. Navy Electronics Laboratory, San Diego, Calif. *Journa, of Dental Research*, September–October 1959.

PRIMARY PSYCHIATRIC DISORDERS ON A DEPENDENT MEDICAL SERVICE IN A MILITARY HOSPITAL WITH SPECIAL EMPHASIS ON CONVERSION REACTIONS. Lieutenant A. W. Wolfsohn, MC, USNR, and Lieutenant F. W. Wouters, MC, USNR, U.S. Naval Hospital, Newport, R.I. *Rhode Island Medical Journal*, July 1959.

U.S. Air Force

CRYPTOCOCCOSIS (TORULOSIS) OF THE CENTRAL NERVOUS SYSTEM TREATED WITH AMPHOTERICIN B DURING PREGNANCY. Captain Ronald Feldman, MC, USAF, Brookley Air Force Base, Alabama. *Southern Medical Journal*, November 1959.

NUTRITION RESEARCH FOR MAN IN SPACE FLIGHT. Beatrice Finkelstein, M.S., Aero Medical Laboratory, Wright-Patterson Air Force Base, Ohio, and Lieutenant Colonel Albert Taylor, USAF, VC, Air Research and Development Command, Andrews Air Force Base, Washington, D.C. *Military Medicine*, October 1959.

WORK PROFICIENCY IN THE SPACE CABIN SIMULATOR. Siegfried J. Gerathewohl, Ph.D., U.S. Air Force School of Aviation Medicine, Brooks Air Force Base, Texas. *Aerospace Medicine*, October 1959.

CARBON MONOXIDE DETERMINATION IN AIRCRAFT ACCIDENT FATALITIES. Captain William M. Glantz, USAF, MC, Major Vernie A. Stembridge, USAF, MC, Captain Abel M. Dominguez, USAF, MSC, Leo R. Goldbaum, Ph.D., Captain Herbert E. Christensen, MSC, USA, Major F. Warren Lovell, USAF, MC, Captain Thomas L. Gleason, III, USAF, MSC, and Colonel Frank M. Townsend, USAF, MC, Armed Forces Institute of Pathology, Washington, D.C., and Norton Air Force Base, California. *Aerospace Medicine*, October 1959.

PERITONEAL MESOTHELIOMA, REVIEW AND CASE REPORT. Colonel James T. Hardy, USAF, MC, and Colonel Philip G. Keil, USAF, MC, U.S. Air Force Hospital, Lackland Air Force Base, Texas. *American Journal of Digestive Diseases*, September 1959.

PECTUS EXCAVATUM, SURGICAL EXPERIENCES IN THIRTY-FOUR CASES. Captain John L. Jackson, USAF, MC, Captain Richard E. George, MC, USA, Lieutenant Colonel Thomas H. Hewlett, MC, USA, and Colonel Warner F. Bowers MC, USA, Brooke Army Hospital, Fort Sam Houston, Texas, and Tripler Army Hospital, Hawaii. *American Journal of Surgery*, November 1959.

MALE PSEUDOHERMAPHRODISM, REPORT OF A CASE, WITH OBSERVATIONS ON PATHOGENESIS. Captain Norman M. Kaplan, USAF, MC, U.S. Air Force Hospital, Lackland Air Force Base, Texas. *New England Journal of Medicine*, 24 September 1959.

MOTION SICKNESS ABOARD JET AIRCRAFT, PRELIMINARY REPORT. Colonel Lawrence J. Milch, USAF, and Herbert D. Stallings, Jr., USAF, Randolph Air Force Base, Texas. *Texas Journal of Medicine*, March 1959.

AORTAL CHOLESTEROL CONCENTRATIONS AFTER LINDOXINE ADMINISTRATION IN DOGS. Colonel Lawrence J. Milch, USAF, Leslie G. Robinson, B.S., Sherman S. Wilson, M.S., and Frederick H. Wilson, Jr., B.S., U.S. Air Force School of Aviation Medicine, Brooks Air Force Base, Texas. *American Journal of the Medical Sciences*, November 1959.

HEARING LOSS FROM HIGH INTENSITY SOUND OF JET ENGINES. Captain Henry S. K. Willis, USAF, MC, and Colonel J. Louis Hoffman, USAF, MC, U.S. Air Force Hospital, Westover Air Force Base, Mass. *Aerospace Medicine*, October 1959.

Monthly Message—Continued from page ii

1. *Turkey:* new nutrition laws and allowances in the ration, the establishment of a nutrition institute for the armed forces, and—in cooperation with the Point IV group—the establishment of an excellent packing plant.

2. *Iran:* the modernization and reopening of a packing plant now supplying processed foods to the armed services. The reopening of this plant has increased benefits to the farmers in that area by $250,000 a year. Plans for a second packing plant are under way.

3. *Pakistan:* the establishment of a nutrition institute.

4. *Korea:* measurable improvement in the rations of the armed services and condition of the troops.

5. *Philippines:* request from the Government for further aid in developing future programs.

6. *Ethiopia:* further surveys of 6,000 school children by counterpart members of the original team; production of a film of the work of our nutrition team in that country.

7. *Peru:* prompt establishment of a nutrition institute to serve the armed forces following the survey.

8. *Spain:* translation of the nutrition manual into Spanish and establishment of a nutrition laboratory for the armed forces.

In addition to the above, requests from the United Arab Republic Food Conference in Cairo, and the Middle East Annual Medical Symposium in Beirut for speakers at their meetings were accepted. This is a most important people-to-people type of program.

Frank B. Berry

FRANK B. BERRY, M.D.
Assistant Secretary of Defense
(Health and Medical)

This Is Your A. M. A.

MEDICAL REPRESENTATION to Joint Chiefs of Staff, equitable military call-up of physicians in time of national emergency, the proposal to establish a United States Armed Forces Medical Academy, national emergency medical care, and the military aspects of aeronautics and space matters were among the subjects of particular interest to military physicians that brought policy actions by the House of Delegates at the thirteenth clinical meeting of the American Medical Association at Dallas, Texas, early last December.

The House expressed itself as being in accord with the Board of Trustees and its Council on National Defense concerning the need for military medical logistic, intelligence, and operational planning in the Joint Chiefs of Staff. The Association believes that, under supervision of qualified medical officers of the 3 military services, medical representation is essential to effect coordination of the medical and health aspects of tactical, strategic, and long-range planning in the Joint Staff, the Combined Staff, and the Special Command Staffs. It was affirmed that, for planning purposes, conservation of medical and technical personnel, and the best professional care of troops and civilians, there must always be medical representation at all levels.

In regard to the equitable military call-up of physicians in time of national emergency, the House suggested that the Council on National Defense further pursue this subject with the federal departments concerned in an effort to promote sound stand-by policies for the utilization of medical and health manpower in time of national emergency.

The House reaffirmed the action of the Board of Trustees in opposing legislation to provide for the establishment of a United States Armed Forces Medical Academy.

With respect to the Report on National Emergency Medical Care, the House endorsed the action of the Board of Trustees in approving the report and transmitting it to the Office of Civil and Defense Mobilization. Prepared by a special commission under the guidance of the Council on National Defense at the request of and for the Office of Civil and Defense Mobilization, the report embodies recommendations dealing with the role of the medical and associated professions, their functions, responsibilities, and training for the management and care of casualties and noncasualties prior to, during, and after a thermonuclear attack upon the United States. The House acknowledged that the threat of nuclear warfare has imposed on the medical profession a tremendous responsibility in the nation's effort to survive, and expressed itself in support of the critically important role that the medical profession must assume and be prepared to meet in such an event. Single copies of a 39-page summary of the report in booklet form are available free upon request to the Council on National Defense, American Medical Association, 535 North Dearborn Street, Chicago 10, Illinois.

The House approved the assignment by the Board of Trustees of aeronautics and space matters as they pertain to the medical profession to the Council on Industrial Health and the Council on National Defense. All matters dealing with the technical and professional aspects of aviation and space medicine have been assigned to the former, while to the latter have been assigned those matters concerned with space activities in the government agencies and their organizations and policies as they affect the national security of the nation.

From the Council on National Defense of the American Medical Association. The views and opinions expressed are not necessarily those of the Department of Defense.—EDITOR

Among other major subjects acted upon by the House of Delegates were freedom of choice of physicians, relation between physicians and hospitals, a scholarship program for deserving medical students, and relative value studies of medical services.

In considering 4 resolutions which in various ways would have changed or replaced the statements on freedom of choice of physician which the House adopted in Atlantic City in June 1959, when acting upon the recommendations in the report of the Commission on Medical Care Plans, the House reaffirmed the following 2 statements approved in Atlantic City:

1. The American Medical Association believes that free choice of physician is the right of every individual and one which he should be free to exercise as he chooses.

2. Each individual should be accorded the privilege to select and change his physician at will or to select his preferred system of medical care, and the American Medical Association vigorously supports the right of the individual to choose between these alternatives.

Moreover, in order to clarify and strengthen its position on the issue of freedom of choice of physician, the House also adopted this additional statement which was submitted as a substitute amendment on the floor of the House:

3. Lest there be any misinterpretation, we state unequivocally that the American Medical Association firmly subscribes to freedom of choice of physician and free competition among physicians as being prerequisites to optimal medical care. The benefits of any system which provides medical care must be judged on the degree to which it allows of, or abridges, such freedom of choice and such competition.

To resolve any doubt about its position with respect to the relation of physicians and hospitals, the House reaffirmed its 1951 statement of principles and declared that "all subsequent or inconsistent actions are considered superseded." The House also accepted recommendations that the House of Delegates acknowledge the need to strengthen relationships with hospitals by action at state and local levels; the Board of Trustees of the Association continue to maintain liaison with the Board of Trustees of the American Hospital Association; and the Council on Medical Service review this entire problem to ascertain if there have been actions inconsistent with the 1951 guides, and report to the House at the earliest practical time.

In regard to a scholarship program to help meet the need for an increasing number of physicians in the future, the House approved the creation of a special study committee which was asked to: (1) present a scholarship program, its development, administration, and the role of the American Medical Association in fulfilling it; (2) ascertain the maximum to which medical schools could expand their student bodies while maintaining the quality of medical education; (3) ascertain what universities can support new medical schools with qualified students and sufficient clinical material for teaching, either on a 2-year or a full 4-year basis; (4) investigate the securing of competent medical faculties; (5) investigate financing of expansion and establishment of medical schools; (6) investigate financing of medical education as to the most economical methods of obtaining high-quality medical training; (7) develop methods of getting well-qualified students to undertake the study of medicine; and (8) investigate the possibility of relaxing rigid geographic restrictions on the admission of students to medical schools. The House urged that the special committee be implemented promptly with adequate funds and staff so that it may make an initial report by June 1960.

Concerning relative value studies of medical services, the House, reaffirming a previous policy statement, approved in principle the conducting of such studies by each state medical association, rather than a nationwide study or a series of regional studies by the American Medical Association. The House also reiterated its authorization for the Committee on Medical Practices to inform each state

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medical association, through regional or other meetings, of the purpose, scope, and objectives of such studies, the steps to be followed in conducting studies, the problems which may be encountered, and the manner in which the results can be applied.

The House recognized, however, that some state medical associations are either not interested in relative value studies or are actively opposed to them. It pointed out that some state medical associations fear that the regional conferences of the Committee on Medical Practices will put pressure on them to carry out such studies and that this will result in the adoption of "fixed fees."

Since the regional conferences are educational in nature, the House said, it remains for each state or county medical association to accept or reject the idea of a study in its area.

The House expressed awareness of the fact that this is still a controversial matter. However, it commended the Committee on Medical Practices for its effort to carry out the instructions of the House, and it urged the committee to continue its educational work.

DO YOU HAVE GLOIDS?

A special kind of disease-naming is done by those branches of industry whose sales depend largely on the planned creation of non-existent diseases, such as night starvation, hidden hunger, and tired blood. In this highly creative and imaginative work the importance of a good name cannot be exaggerated. One weekly paper ran a competition for an advertisement introducing a new disease with a patent medicine to cure it. Here are a few extracts from one of the winning entries:

> "Have you shoddy juvicles? Do you moil at night and wake prinkling with a throbble? You are almost certainly suffering from Gloids. Waste no time. Write immediately in strict confidence for our free booklet prepared by a well-known Harley Street doctor. Mark envelope Dr. X. Gloids. Dept. KZ. All enquiries treated with strictest confidence."

Although this may treat patent medicine disease as a joke, it is a serious matter. We do not know how many bowel neuroses are initiated by relentlessly persuading the public into vain strivings after inner cleanliness.—RICHARD ASHER: Making Sense. *The Lancet*, September 19, 1959.

Book Reviews

THE ECOLOGY OF HUMAN DISEASE, by *Jacques M. May*, M.D., with a foreword by *Félix Martí-Ibáñez*, M.D. 327 pages. MD Publications, Inc., New York, N.Y., 1959. Price $7.50.

Dr. Félix Martí-Ibáñez, professor and director of the department of the history of medicine, New York Medical College, aptly describes the concept of the ecology of human disease, included in the foreword of this book, by stating: "The concept of medical ecology formulated by Dr. May conceives disease as a convergence in time and space within the person of the patient of environmental stimuli (organic, inorganic, or sociocultural). These stimuli are a challenge which induces a tissular response, that is, disease (communicable, degenerative, or behavioral), which in its turn eventually results in ecologic adaptation and survival or in total maladjustment and death." *The Ecology of Human Disease* is an excellent volume for anyone interested in the geographic development of diseases as they pertain to races and populations. Dr. May thoroughly prepares the reader for the individual discussions of the ecology of specific diseases by offering highly interesting commentaries on the nature of disease, the stimuli and responses, the terrain, races, or populations, the changing map of diseases, and cultural factors. The Renaissance was the first sign of "mankind's yearning to probe all the chambers of the planet he inhabited, of which he then knew only the anteroom." Thirteen chapters have been devoted to the ecology of cholera, brucellosis, poliomyelitis, tuberculosis, leprosy, bacillary dysentery, salmonellosis, amebiasis, yaws, scarlet fever, measles, trachoma, and certain two-factor nematode infections of man. In broad terms, the author presents interesting facets of these diseases through his discussions of definitions, agents, hosts, susceptibility, geographic distribution, future possibilities, and his own personal conclusions. No attempt is made to use illustrations because the charts, graphs, and maps very adequately depict the information Dr. May desires to present. He has developed this volume in such a fashion that one becomes acutely aware of the importance geography plays in human disease and of the fact that the most dreaded epidemics followed the earliest caravan routes of the world. As the author states, even though the genetic structure of an individual is stable, his tissues and functions are endowed with a certain plasticity that allows them to adapt to the environment. Military medical men might well place this volume in a conspicuous area of their libraries since the exigencies of the service carry them to the far corners of the globe. Not only will the geographic implications of these diseases be of importance to them, but they will also find within the concept of this book that they themselves might well be the star performers in exactly what Dr. May so brilliantly presents. It would not be feasible for one author, or a group of authors, to attempt encompassing in a single volume the details and ramifications of the health problems of an army in a global struggle, so that this volume in itself would be an important adjunct to the military medical mind. Human environment is continuously full of challenges that combine to oppress man and to jeopardize his survival. As the author states: "In order to survive, man or societies have to come into contact with these challenges. Because of their way of life, of their culture, men and their aggressors are brought close together or kept at a distance." The typography and design of the book are in

excellent taste and the bibliography is especially noteworthy. This book is highly recommended for all individuals whose present or future responsibilities require a broad knowledge of the nature of disease and the health factors involved in the international problems of today.

COL. JOHN BOYD COATES, JR., MC, USA

RESPIRATORY PHYSIOLOGY AND ITS CLINICAL APPLICATION, by *John H. Knowles*, M.D. 256 pages; illustrated. Harvard University Press, Cambridge, Mass., 1959. Price $5.25.

This book describes the application of pulmonary function testing in the evaluation and management of disease states. It discusses methods, calculations, and interpretation of results. The detailed bibliography identifies sources for further information about particular areas of pure physiology and disease states. The book contains pertinent information about the various areas of pulmonary function testing, including ventilation, respiratory gas exchange, and the mechanics of breathing. The methods best suited for the evaluation of these functions of the respiratory apparatus are presented and discussed. In particular the material dealing with the interpretations of results will be most valuable to clinicians. Excellent and detailed discussions are presented on the major pulmonary disease states that result in pulmonary insufficiency. The pathologic physiology responsible for pulmonary insufficiency in these disease states is described. This is an excellent book. It brings together under a single cover a tremendous amount of information which heretofore was widely scattered in the literature. In addition it provides the author's personal thinking on the subject.

MAJ. JAMES C. SYNER, MC, USA

BASIC SURGERY, edited by *Leslie Oliver*, M.B., B.S. (Lond.), F.R.C.S. (Eng.), F.A.C.S., with 8 contributors. 1,359 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $26.50.

This textbook presents the current practice and opinion of various surgeons connected with clinics and hospitals in England and represents an attempt to survey the field of general surgery and the surgical specialities, with the exception of ophthalmology and otolaryngology. It is well written and the subject matter is presented in a straightforward and readable style. There are many illustrations and most of them are simple and clear. No references are given at the end of each chapter. Since this is a British book there are slight differences in emphasis and nomenclature. The direct, terse statements by the authors tend to give general principles and exclude operative details; in many instances management detail has also been sacrificed. Of necessity, the presentation of some topics is extremely brief because of the magnitude of the attempt to be all inclusive. In fact, one criticism of the book is that on the one hand it is too long to be merely a synopsis, while on the other it is too short and incomplete to be a well-rounded textbook for the graduate student. The reviewer believes that in a textbook of basic surgery the inclusion of such topics as wound healing, anesthesia, and preoperative and postoperative treatment would be a valuable and indispensable addition. It seems unlikely, therefore, that this book will fully serve its intended purpose for the serious medical student or for the graduate physician. Rather, it will find its greatest value primarily for undergraduate students, especially in the preclinical years.

CAPT. JAMES D. KING, MC, USN

PROGRESS IN HEMATOLOGY, Vol. II, edited by *Leandro M. Tocantins*, M.D., with 19 contributors. 290 pages; illustrated. Grune & Stratton, Inc., New York, N.Y., 1959. $9.75.

Volume I of this book was published in 1956. Its purpose was to describe some of the important concepts that had developed within the field of hematology. That edition was a success because it combined in one volume the most recent thinking as summarized by well-known workers. One reviewer at the time expressed the hope that volumes would be published periodically in order to keep interested workers abreast in this most rapidly changing field of hematology Now, 4 years later, volume II is available and it has the same standard of quality as its predecessor. The contributors represent many of the recognized centers actively engaged in hematologic research. Their articles represent the present-day thinking within the particular field. One hesitates to single out any particular section of the book because each contributor has presented his section in an outstanding manner. The background work, present feeling, and future suggested lines of research are outlined in a very readable and interesting manner. The editor and his contributors are to be congratulated on the excellence of this volume. It is hoped that future volumes will be published. This is a worthwhile book for those who treat hematologic disorders.

COL. WILLIAM G. DUNNINGTON, MC, USA

CLINICAL ORTHOPAEDICS, edited by *Anthony F. DePalma*, with the assistance of the associate editors, the board of advisory editors and the board of corresponding editors. No. 13, Spring, 1959. 393 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $7.50.

This bound journal is the thirteenth in a series that has established an enviable record since the first number was published in 1953. As has been the custom in the past, the first section is devoted to a single subject, in this instance a symposium of 210 pages on the presently popular and important subject of the hand. A brief tribute to the late Sterling Bunnel logically precedes the section on the hand. A chapter on Dupuytren's contracture somehow was misplaced and appears in the second section on general orthopedics. The third and final section, again entitled Items, includes 6 brief chapters. The first section on the hand is well presented by 18 accomplished authors in the field. Chapter 2, dealing with the comparative anthropology of man's hand, is interesting and instructive albeit somewhat more philosophic than clinical. Most of the material presented in this section has been published elsewhere, but these articles lose nothing by repetition. Ten articles on general orthopedic subjects are together worth reading but Wiltsie's presentation of resection of the major portion of the calcaneus is outstanding. The final 6 items are interesting but not quite up to the quality of previous sections. Readers will probably skip over these pages rapidly with the possible exception of McKeever's article on excision of the fifth metatarsal head, which seems to have been mistitled in that he describes resection of more than the distal one half of this bone. This journal is abundantly illustrated, with illustrations, in general, of high quality. A notable exception to this is observed in the article dealing with os calcis fractures. Several reproductions of roentgenograms presented here cannot be recognized as bone let alone as os calcis. A complete index for this volume is included, along with a cumulative index for volumes 7 to 12 inclusive. The hand surgeon, the orthopedic surgeon, and especially the orthpedic resident will benefit by reading this journal.

CAPT. CLIFFORD A. STEVENSON, MC, USN

DIAGNOSIS OF CONGENITAL HEART DISEASE, A Clinical and Technical Study by the Cardiologic Team of the Pediatric Clinic, Karolinska Sjukhuset, Stockholm, by *Sven R. Kjellberg, Edgar Mannheimer, Ulf Rudhe* and *Bengt Jonsson*. 2d edition. 866 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1959. Price $28.

This book might better be called a roentgenographic atlas of congenital heart disease inasmuch as pages of illustrations, many of them roentgenographs, outnumber pages of text. An 866-page volume devoted to the diagnosis of congenital heart disease, the present volume will probably not meet with widespread acceptance by pediatricians in general because of the narrow scope of the subject matter. There is no discussion of therapy or management, nor are the arrhythmias included. Discussion is limited to diagnostic consideration of 26 organic lesions. For a volume of this size and cost, the reviewer was disappointed with the almost spartan manner of presentation of the text. The illustrations, while of excellent quality and detail, often do not demonstrate the specific lesions as well as do comparable plates in other texts. There are excellent chapters on embryology, roentgenographic anatomy, and physiology of the heart, and on the technics of phonocardiography, electrokymography, cardiac catheterization, and angiocardiography, which will be of interest to the reader. Inclusion of brief case histories illustrating the varying clinical picture of the same congenital lesion are worthy of note. The book will be a valued edition to the cardiologist and to hospital libraries, but because of both price and limited general appeal the pediatrician will consider it a specialized reference rather than a book to be used frequently in practice.

MAJ. FREDERICK C. BIEHUSEN, MC, USA

A SHORT TEXTBOOK OF RADIOTHERAPY, for Technicians and Students, by *J. Walter*, M.A., B.M. (Oxfd.), M.R.C.P. (Lond.), F.F.R., D.M.R.E. (Camb.), and *H. Miller*, M A., Ph. D. (Camb.), F. Inst. P. 2d edition. 527 pages; illustrated. Little, Brown & Co., Boston, Mass., 1959.

As far as this reviewer knows, this is the only textbook which aims at teaching technics in radiation therapy. As such, it serves a real need and is highly recommended to all x-ray technicians and residents in radiology. The basic principles of radiation physics are presented in brief and concise form; the most modern radiation equipment, accessories, and tools are briefly described. This material is presented in the first half of the book and is well illustrated. Applicable technics in orthovoltage and supervoltage x-rays and the uses of radioactive isotopes are adequately described and up to date. The hazards of radiation, the handling of radium, isotopes, and x-ray equipment, in addition to the study of the biologic effects of radiation, are well taken. The value of radiation therapy in dermatology and the practical treatment of some dermatologic conditions by radiation methods are described and illustrated. Radiation methods and applicable technics of treatment of some of the more common malignant lesions are described in some detail and are well illustrated with photos and sketches. For the technician, the material in this book is invaluable. The resident physician in radiology will find the volume handy and useful; he will, however, find it necessary to supplement it with more material in anatomy, pathology, radiation biology, different treatment technics, and dosages and with more radiologic and surgical statistical data. The American student should be aware of the slight differences in terminology and classification of diseases, and should supplement the reference book list with some of the more recently published American textbooks in radiation therapy.

COL. PETER ZANCA, MC, USA

PHYSIOLOGY OF MOTION, Demonstrated by Means of Electrical Stimulation and Clinical Observation and Applied to the Study of Paralysis and Deformities, by Dr. *G. B. Duchenne*. Translated and edited by *Emanuel B. Kaplan*, M.D. 612 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $11.

Kaplan's recently published English translation of G. B. A. Duchenne's "Physiologie des Mouvements" (1883) unquestionably provides an enrichment of the medical literature. "The book," as the translator points out, "may be placed among the greatest books of all times not on account of its historical significance, but because it contains an excellent record of the kinesiology of the entire muscular system." It must be considered modern although it was written so many years ago. The translation into English may result in a much wider distribution and recognition. As far back as 1835 Duchenne applied faradic current to stimulate muscles for diagnostic and therapeutic purposes. During many years of extensive research he investigated and described the action of the single muscle and of the various portions of large muscles, and also the movements resulting from the synergism or antagonism of muscle groups. It is of great interest to follow the author in his scientific argumentation for or against existing theories of locomotion. In order to prove his point against well-established doctrines he had to demonstrate convincingly his diverging findings through direct and indirect experimentation. One cannot help but admire the logical interpretation of his observations. When, occasionally, his conclusions appear to be in some disagreement with present concepts—as for instance in the chapter on the mechanics of respiration—one can almost be sure that the problem is not definitely solved. Thus, the book can be very stimulating for investigators concerned with biodynamic functions. It is also of practical value to the student of medicine and of related sciences, to practicing physicians, and to physical educators. Its fundamental information is most valuable for the orthopedic surgeon and the physiotherapist, as well as the anatomist and neurologist.

BRUNO BALKE, M.D

TREATMENT OF CANCER AND ALLIED DISEASES. Volume III: Tumors of the Neck and Head, edited by *George T. Pack*, M.D., F.A.C.S., and *Irving M. Ariel*, M.D., F.A.C.S., with 70 contributors. 2d edition. 781 pages; illustrated. Paul B. Hoeber, Inc., Medical Book Department of Harper & Bros., New York, N.Y., 1959. Price $30.

This book is a careful mixture of principle and detail. Every possible aspect of tumors of the head and neck is covered so completely that it is one of the most valuable single volume references in the field. Although other works on maxillofacial surgery contain more detailed information on plastic surgery, and other books contain more information on radiation therapeutics in the treatment of malignancy, no other volume contains so much information in regard to the logical, step-by-step approach to the diagnosis and treatment of tumors of the head and neck. Seventy outstanding authors have contributed to the various aspects of this subject, which includes sections on general principles; tumors of the mouth, pharynx, nose, and sinuses; and others on the ear, eye, larynx, neck, and the thyroid and parathyroid glands. Each section contains contributions which include incidence, etiology, differential diagnosis and the various treatment modalities available for the institution of therapy. Where applicable, recovery statistics resulting from the use of the various modalities either alone or in combination are presented. The physician reader using this book as a reference work can easily determine the course of treatment required by his patient. The surgeon finds descriptive line diagrams illustrating the

operative procedure to be followed. The roentgenologist finds contributions on the proper radiation modalities and dosages to be used. This book is an essential reference volume for all physicians who practice the diagnosis and treatment of tumors of the head and neck. LT. COL. H. HASKELL ZIPERMAN, MC, USA

MOLECULES AND MENTAL HEALTH, edited by *Frederic A. Gibbs*, M.D. 189 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $4.75.

This series of papers and discussions, presented during the first 3 sessions of the scientific conference of the Brain Research Foundation during 1957 and 1958, is divided into 2 parts: Amines in Relation to Brain Function and Behavior; ACTH Treatment of Hypsarhythmia. The basic philosophy underlying the book is expressed by Gibbs: "Chemical derangements underlie mental retardation, insanity and unconsciousness and all the symptoms that the brain can produce." Unquestionably this approach to psychic phenomena will ultimately elucidate the physicochemical and biologic mechanisms of brain functioning. The belief that thought, personality, judgment, and creative imagery are explicable in the same terms is questionable. Nowhere is there an explanation of how 3 different orders of abstraction—molecular, biologic and psychic—are to be translated into common terms. One cannot "explain" complex social interactions in terms of molecular theory, even though, undeniably, there is a relationship between the two. The first part of the book includes papers on the controversial subjects of ceruloplasm, taraxein, and adrenochrome and their relationship to mental illness. The case for these substances and their relationship to schizophrenia is convincingly presented in the papers by Drs. Abood, Heath, and Hoffer. Yet, many discussants express contrary opinions based on their own negative results and on criticism of the assay methodology. The controversy is far from settled. Dr. Zeller presents the results of his ingenious experiments on tryptophan metabolism in schizophrenics and controls. He finds a significant difference in the 2 groups and, in addition, indication of pathways of metabolism other than oxidation deamination. Dr. Kopin, a discussant, has not been able to verify these results in his laboratory except on the basis that the patients received too much water and insufficient vitamins. Dr. Abood and his associates present studies with a new class of psychotogenic substances, the piperidyl benzilates. A progress report by Dr. Elmadjian on his classic experiments with the excretion and metabolism of epinephrine and norepinephrine in man includes fundamental findings on the metabolism of these substances using iproniazid as an inhibitor of oxidative deamination. These studies are further elaborated by Drs. Resnick and Axelrod in the discussion. A paper by Pfeiffer and co-workers on acetylcholine is essentially a study of deanol and its metabolic effects. Part two of the book is a series of papers on the diagnosis, treatment, and pathology of Gibbs' Disease, hypsarhythmia. Known for about 10 years and identified electroencephalographically by Gibbs and Gibbs in 1950, this disorder has recently been found to respond to treatment with ACTH under certain conditions. Dr. Lucien Sorel, who discovered and developed this therapy, presents an interesting paper on the condition. A number of contributors elaborate their findings and conclusions in this interesting chapter of neurologic therapy. References are scattered throughout the text and a well-selected bibliography is appended for each chapter. This short book presents in a fascinating manner the current trend in the "molecular theory" of neuropsychiatry. As such it is highly recommended to all neurologists and psychiatrists and to experimentalists in the fields of neurophysiology, neuropharmacology, and neurochemistry. Pediatricians should be well versed in the section on hypsarhythmia. MAJ. ROBERT F. HOOD, USAF, MC

CLINICAL VETERINARY SURGERY, Volume I: General Principles and Diagnosis by *R. H. Smythe*, M.R. C.V.S. 362 pages; illustrated. Charles C Thomas, Publishers, Springfield, Ill., 1959.

As the title explains, this text is concerned only with general surgical principles and the art of clinical diagnosis. A future volume is planned to discuss surgical technics and specific operative procedures. The author, a British practitioner, speaks with the authority of a wide and extensive clinical experience. The first portion of the book, which reviews the physiologic and pathologic aspects of surgical diagnosis, suffers from being overly condensed, so that often the author's point is not clear. The text stresses the large domestic animals, primarily the horse and cow, and thus would be of most value to the rural practitioner. Differences in nomenclature and references to drugs with which he is unfamiliar will to some degree confuse the American reader. The most valuable portion of the book both for the practitioner and the student is the excellent chapter on equine lameness. Realizing that the veterinarian is often limited by economic considerations and the animal's future potential usefulness, the author has throughout the book stressed diagnosis based upon the clinician's observations and evaluation of the patient, reserving specific mechanical or laboratory diagnostic tests for cases in which they are absolutely essential for correct diagnosis and therapy.

LT. COL. ROBERT M. NIMS, VC, USA

AUTOMATIC VENTILATION OF THE LUNGS, by *William W. Mushin*, M.A., M.B., B.S., F.F.R.C.S., F.F.A.R.C.S.; *L. Rendell-Baker*, M.B. B.S., F.F.A.R.C.S.; and *Peter W. Thompson*, B.A., M.B., B. Chir., F.F.A.R.C.S., with chapters on Physics of Automatic Ventilators, by *W. W. Mapleson*, Ph. D., A. Inst. P. 349 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $10.50.

Some 25 years ago it was proposed that controlled respiration could provide a quieter operative field during abdominal surgery. Since then, and especially since the advent of the muscle relaxants, controlled ventilation of the patient's lungs has come to play a larger and larger role in patient care. During the past few years numerous automatic ventilators of increasing complexity have appeared to assist and yet equally to perplex anesthesiologists and pulmonary physiologists alike. In this text Dr. Mushin and his co-workers have at last established order out of the multitudes of ventilators available throughout the world today. The initial chapters of the book are concerned with fundamental principles and the basic physics involved in controlled respiration. With this as a background, each of the automatic and manual ventilators are categorized as to type (time cycled, pressure cycled, volume cycled or mixed), fully illustrated and discussed as to mechanics, and then functionally analyzed. This text is outstanding and is highly recommended to those interested in the principles and mechanics of automatic ventilators.

CAPT. JAMES G. KURFEES, MC, USN

EVALUATION OF CHANGES ASSOCIATED WITH PSYCHIATRIC TREATMENT, by *Marvin Reznikoff*, M.A., Ph.D., and *Laura C. Toomey*, M.A. 132 pages. Charles C Thomas, Publisher, Springfield Ill., 1959. Price $4.50.

What started out to be a review of literature concerning changes occurring in psychotherapy as measured by psychologic tests was expanded to include other methods of treatment and measurement. The result is this small book. The authors extract from and comment on 193 references, mostly articles published

from 1941 through 1956. One of their conclusions is that clinical research designs are improving, becoming more scientific, even though there are still many practical and theoretic problems to be solved, such as a need for better identification and control of variables, and selection of criteria to be tested. Among the methods of evaluation reviewed are clinical judgments, psychologic tests, physiologic measures, content analysis, and intra-individual ratings of various kinds. Since this is a review, it does not present anything new, but it does provide a good bibliography and a critical analysis of the subject. Furthermore, it might serve to stimulate better research designs in what has so far been an area resistant to scientific appraisal. LT. COL. WILLIAM H. ANDERSON, MC, USA

RECREATION IN TOTAL REHABILITATION, by *Josephine L. Rathbone*, Ph. D., and *Carol Lucas*, Ed.D. 398 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $9.50.

Part I of this 3-part book is devoted to the orientation of the recreation specialist who is to be concerned with the ill or handicapped individual in a hospital or institutional atmosphere for the first time. A great deal of emphasis is placed on the need for a recreation program in all types of medical treatment centers and on the underlying philosophy of recreation in rehabilitation. Part II is concerned with medical indication for recreational activities. The authors carefully point out that all activity is at the discretion of the physician in charge. Classifications of diseases and other conditions are made and considered briefly from the recreation point of view. Much of this section is devoted to definitions of medical terminology and is written primarily for the layman. The third part of the book deals entirely with recreational modalities including music, graphic and plastic arts, crafts, hobbies, literature and theater, games and sports, dancing, and special events such as parties. These major divisions of recreation and their many subdivisions are treated superficially by the authors. Each is defined and simple examples are presented. The book was obviously intended only as a guide to the student in the field of recreation for the ill and handicapped or to volunteer workers to be expanded according to particular group problems or needs. LT. COL. JAMES D. AMOS, MC, USA

PHYSIOLOGY OF PREMATURITY, Transactions of the Third Conference, March 25, 26, and 27, 1958, edited by *Jonathan R. Lanman*, M.D., 157 pages; illustrated. The Josiah Macy, Jr., Foundation, New York, N.Y., 1959. Price $3.

This book is an attempt to stimulate research and promote effective communication across the departmental walls which tend to isolate the professions and specialties from one another. It deals with the metabolic and enzymic changes during development, with particular stress on bile pigment metabolism and liver function in the premature infant. The causes, effects, and treatment of hyperbilirubinemia are discussed in detail. The individual presentation of each subject combined with group interchange of ideas and discussions was pleasing to this reviewer. The informality of the presentation and the frequent interruptions by the participants in the form of questions, criticism, or comments tended to highlight the subject rather than cause digressions. There are excellent graphs and photographs and each section has a bibliography for those interested in reading further. It is believed that this type of conference, composed of various departments of medicine, both clinical and nonclinical, will do more to fill the gaps in knowledge than the purely didactic lecture. CAPT. ERNST R. MOELLER, MC, USN

CEREBRAL ANGIOGRAPHY IN THE MANAGEMENT OF HEAD TRAUMA, by *Charles A. Carton*, M.D. Publication No. 336, American Lecture Series. A Monograph in The Bannerstone Division of American Lectures in Surgery, edited by *Michael E. DeBakey*, M.D., and *R. Glen Spurling*, M.D. 157 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.

This monograph presents a very worthwhile collection of arteriograms pertinent to the management of severe intracranial injury. In a series of 1,079 cases of head trauma, 103 patients (10 percent) had angiograms performed. In a series of 111 angiograms, 57 (50 percent) showed surgical lesions. The relative safety of this diagnostic approach is well documented. However, two possible criticisms might be mentioned. First is the technical problem of the extreme difficulty of reducing arteriogram x-ray films to small printed illustrations. In general this has been accomplished very well with a minimum of objectionable retouching. Second, the author in his emphasis on angiography, perhaps fails to point out clearly that even in some nonemergency cases, some surgeons still believe that there may be instances where exploratory trephinations might be preferable, at which time definitive therapy could be instituted without the second operative procedure of angiography. This volume will be of definite interest to all neurosurgeons who deal with acute and chronic trauma.

LT. COMDR. BENJAMIN L. CRUE, JR., MC, USN

SURVEY OF CLINICAL PEDIATRICS, by *Lawrence B. Slobody*, M.D. 3d edition. 556 pages. Blakiston Division, McGraw-Hill Book Co., Inc., New York, N.Y., 1959. Price $11.

In the preface of this survey of clinical pediatrics the author states that it is not intended to replace the excellent large textbooks now available, but designed to help the student and practitioner focus on the highlights of pediatrics. These highlights are presented in 13 chapters in a modified outline form, and a fairly comprehensive group of review questions follows each chapter. An appendix outlines in detail the pediatric history and physical examination, and the final 26 pages are devoted to an index. There are no references, and on any controversial subject, majority opinion is given. The book may be considered excellent for the student of medicine reviewing for examination, or may serve the practitioner well as a quick reference. For the pediatrician, however, interested in the broader approach to his specialty, more will be demanded. In any case, the author has done well what he set out to do.

COL. OGDEN C. BRUTON, MC, USA

HEAVY METALS AND THE BRAIN, by *John N. Cumings*, M.D., F.R.C.P. 161 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.

This book presents the neurologic aspects of heavy metal toxicology. Treated are hepatolenticular degeneration as a disorder of copper metabolism, the neurologic effects of mercury poisoning, and the features of lead encephalopathy. The book provides a comprehensive and exhaustive list of pertinent data and references. A definite gap in the existing literature has been closed. Because of the advanced specialization of medical fields, it is sometimes difficult to find all aspects of a medical problem treated in the literature, e.g., the neurologic aspects as well as those of internal medicine. Dr. Cumings' book is a gratifying help for any one who has to deal with central nervous system pathology due to heavy metal poisoning and who needs data that are mostly dispersed throughout the existing literature.

OTTO STOCHDORPH, M.D.

SYSTEMIC LUPUS ERYTHEMATOSUS, A Mount Sinai Hospital Monograph, edited by *George Baehr*, M.D., and *Paul Klemperer*, M.D., with 8 contributors. 84 pages; illustrated. Grune & Stratton, Inc., New York, N.Y., 1959. Price $3.75.

That a monograph on systemic lupus erythematosus should be written by physicians associated with the Mount Sinai Hospital will seem most fitting to those physicians who over the years have followed the medical literature on this disease, for so many important contributions to our knowledge of S.L.E. have come from investigators working at this hospital. In the first of the 6 chapters comprising this book, Dr. Pollack discusses the pathology of S.L.E. under 3 main headings: connective tissue changes, cellular changes, and granulomatous manifestations. This chapter is well illustrated by good photomicrographs, both black and white and in color. The chapter by Dr. Godman on the nature and pathogenic significance of the L.E. cell phenomenon was the most difficult for this reviewer to assimilate, yet the most rewarding in providing a cognizance of the steady progress being made, particularly through the use of histochemical and immunologic technics, toward unveiling the true nature of the disease. In a very interesting chapter on the blood in S.L.E., Doctors Lee and Davis discuss the great variety of "auto-antibodies" found in this disease. These authors point out that proof has not yet been established for the attractive theory that the major clinical and anatomic manifestations of S.L.E. may be attributed to the action of "auto-antibodies." They conclude that should this hypothesis be substantiated the fundamental research problem remaining will be to determine the reason for the production of abnormal antibodies in this disease. The remaining 3 chapters present well-written discussions of the clinical features of S.L.E., by Dr. Jarcho, S.L.E. in childhood by Doctors Gribetz and Henley, and therapy of S.L.E. by Dr. Soffer. This monograph is recommended to all students and physicians for the great intellectual pleasure to be derived and as an introduction to the technics of research in autoimmunology, which in the future may provide the correct route to the discovery of the pathogenesis of a number of diseases.

MAJ. PERRY B. MILLER, USAF, MC

ATLAS OF ROENTGENOGRAPHIC MEASUREMENT, by *Lee B. Lusted*, M.D., and *Theodore E. Keats*, M.D. 176 pages; illustrated. Year Book Publishers, Inc., Chicago, Ill., 1959. Price $9.

This new book fills a need in radiologic literature in that it combines measurements used in everyday practice in one handy reference volume. Being an atlas, it contains a large number of illustrations, nearly all of which are line drawings, together with a number of charts. The book is quite useful in that it eliminates time-consuming searches through an assortment of books and pamphlets for a desired chart. The first 3 pages are devoted to methods used for correction of the geometric distortion of the x-ray image. Considerable space in the book is devoted to measurements which might be considered of dubious value, such as those of the adult stomach and duodenum, of cecum diameter, and of spleen length. It is also doubtful whether the 4 pages devoted to tables for the linear growth of long bones will find much use. On the other hand, a striking omission is the absence of any localization methods for foreign bodies in the eye. Nevertheless, this book will find a useful place in the library of residents and practitioners of radiology. It is printed on good paper and is properly indexed.

CAPT. CLEMENT D. BURROUGHS, MC, USN (RET.)

DISEASES OF CHILDREN IN THE SUBTROPICS AND TROPICS, by *H. C. Trowell*, O.B.E., M.D., F.R.C.P., and *D. B. Jelliffe*, M.D., M.R.C.P., D.C.H., D.T.M. & H. 919 pages; illustrated. The Williams & Wilkins Co., Baltimore, Md., 1958. Price $18.50.

This book is fascinating from two aspects. First, it is a multiple-author text, and the authors are drawn from all over the world, many of them being physicians famous in their own right but unknown to provincial Americans. Second, much of the text is devoted to diseases now almost unknown in our country. One gets the feeling that he is reading an old textbook that has suddenly been brought up to date. As its title would imply, the greater portion of the book is devoted to tropical diseases. It is rather startling to be confronted with diseases that raise havoc in much of the world, concerning which we in this country know practically nothing. Any doctor will find this an interesting and informative work. Medical officers who find themselves assigned outside the United States would do well to have a copy in their possession. It is well illustrated.

COL. LEO J. GEPPERT, MC, USA

NUTRITIONAL DIAGNOSIS, by *Grace A. Goldsmith*, B.S., M.D., M.S. (Med.), F.A.C.P. 164 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $5.50.

This small volume is essentially a comprehensive review in outline form of the general subject of nutritional substances and diseases related to them. At the beginning of the monograph there are a number of excellent tables of foodstuffs, physical signs, symptoms, and laboratory procedures. The remainder of the book consists of a discussion of current knowledge concerning calories, proteins, carbohydrates, lipids, minerals, and vitamins. As the title implies, emphasis is placed on the diagnosis of disorders concerned with the lack of or, in some cases, excess of these vital substances. This volume is worthwhile as a handy quick reference in readable form. The contents are factual, simply presented, written in an objective manner, and contain a minimum of conjectural material.

CAPT. ROBERT J. WHIPPLE, MC, USN

GLAUCOMA, Transactions of the Third Conference, January 8, 9 and 10, 1958, Princeton, N.J., edited by *Frank W. Newell*, M.D. 272 pages; illustrated. Josiah Macy, Jr., Foundation, New York, N.Y., 1959. Price $5.25.

This symposium, held in January 1958 under the chairmanship of Dr. Peter Kronfeld, presents some of the latest advances in the rapidly developing field of glaucoma by a distinguished panel of experts. The main subjects presented are tonography, osmotic factors in the formation of aqueous, consensual changes in intraocular pressure under experimental conditions and the use of tonography in the clinical management of glaucoma. The importance of the P_o/C ratio in the diagnosis and prognosis of glaucoma is emphasized. When the diagnosis is based solely upon a single intraocular pressure, many cases escape detection, yet low facility of outflow will reveal the true status. Conversely, borderline facility of outflow may occur in eyes with increased tension. It is the consensus that when P_o/C is greater than 100, glaucoma exists. This same ratio following a water drinking test, using the highest tension as the P_o value, and tonography done at one hour, yields an even earlier sign of glaucoma and is of great prognostic significance. This book provides excellent insight into this complex and highly important field.

LT. COL. JOHN E. EDWARDS, MC, USA

TEXTBOOK OF PEDIATRICS, edited by *Waldo E. Nelson*, M.D., D. Sc., with the collaboration of 81 contributors. 7th edition. 1,462 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $16.50.

Once again the contributors and editors of this volume have succeeded in offering the student and practitioner the best general textbook of pediatrics available in the English language. The editor's skill in handling the literary efforts of so many contributors so that the text has cohesiveness and purpose will be appreciated by the reader. This is an easy textbook to read. When one considers that it approximates complete coverage of a major division of medicine, the editor's competence in producing so readable a text will be more fully appreciated. This edition is a "word-by-word" revision or reappraisal of its predecessor; the result is really a new offspring and not just a new dress for the last edition. Many sections of the book have been completely rewritten, and at least 8 new chapters have been added. These additions, covering such topics as tropical eosinophilia, kala-azar, and cirrhosis of the liver in Indian children, will enhance the value of this book for physicians caring for the millions of children in the newly emerging nations. The scope of this text is almost encyclopedic, covering the functional as well as the organic disorders of not only infants and children but also, in a more limited manner, adolescents. This volume is enthusiastically recommended for anyone interested in the medical problems of children. In the reviewer's opinion, it is the best and most up-to-date textbook of pediatrics available to the English-speaking physician.

CAPT. THOMAS E. CONE, JR., MC, USN

HYPERTENSION, The First Hahnemann Symposium on Hypertensive Disease, edited by *John H. Moyer, M.D.*, with 6 contributors. 790 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $14.

In its literal and philological derivation the word "symposium" comes to us unchanged from the ancient Greeks, to whom it meant a feasting and drinking party. Inasmuch as this well turned-out volume is a product of 98 named contributors, 1 editor, 6 associate editors and unnamed others, it may well be that the hundred plus people concerned with its making did literally feast and drink at a smorgasbord of present-day knowledge on hypertension. Either way it is a good collation of just about everything known and unknown on this subject. A major and persistent theme throughout the volume is that the vascular changes and consequently the symptomatology of hypertension are probably a direct result of the blood pressure elevation, and therefore it behooves the clinician to treat blood pressure elevation with understanding and all means available. To aid him in doing so the contents begin with a section on the pathology of hypertension and proceed in a well-organized fashion through subsequent sections on the etiology of hypertension, the pharmacology and use of anti-hypertensive drugs, the role of salt, and the use of diuretics, plus special sections and discussions on the surgical treatment of hypertension. The concluding parts cover the effect of therapy on prognosis, and lastly there is a panel discussion on recommended drug treatment. No absolutely new, radical or revolutionary concepts are presented, but all the known material on the subject is well summarized, with particular emphasis on the important developments and therapy that have been brought about in the past few years. The practitioner who wants a special reference, the student who wants to do extra reading, instructors who need a ready, well-documented reference work on elevated blood pressure, and others will find this a helpful and useful volume. COL. FRANK L. BAUER, MC, USA

New Books

Books received by the U.S. ARMED FORCES MEDICAL JOURNAL *are listed in this department for the information of readers, and as acknowledgement and appreciation of their receipt from the publishers. Those of greatest interest will be selected for review in a subsequent number of the* JOURNAL.

TABULATING EQUIPMENT AND ARMY MEDICAL STATISTICS, by Brig. Gen. *Albert G. Love*, USA (Ret.), Col. *Eugene L. Hamilton*, MSC, USAR, and *Ida Levin Hellman*, M. Sc. 202 pages; illustrated. Office of the Surgeon General, Department of the Army, Washington, D.C., 1958. Price $2. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C.

THE SURGEON AND THE CHILD, by *Willis J. Potts*, M.D. 255 pages; illustrated. W. B. Saunders Co., Philadelphia, Pa., 1959. Price $7.50.

HUMAN RELATIONS IN NURSING, A Textbook in Sociology, by *Wayland J. Hayes*, Ph. D., and *Rena Gazaway*, R.S., B.S., P.H.N., M.A. 2d edition. 486 pages. W.B. Saunders Co., Philadelphia, Pa., 1959. Price $5.25.

THE MEDIASTINUM, by *Ted F. Leigh*, M.D., and *H. Stephen Weens*, M.D. 246 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $11.50.

A GUIDE TO THE IDENTIFICATION OF THE GENERA OF BACTERIA, with Methods and Digests of Generic Characteristics, by *V. B. D. Skerman*. 217 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $5.50.

CLINICAL SCALAR ELECTROCARDIOGRAPHY, by *Bernard S. Lipman*, A.B., M.D., F.A.C.P., and *Edward Massie*, A.B., M.D., F.A.C.P. 4th edition. 474 pages; illustrated. The Year Book Publishers, Chicago, Ill., 1959. Price $8.

THE BIOLOGY OF MYELIN, edited by *Saul R. Korey*, M.D., with 51 contributors. 401 pages; illustrated. Paul B. Hoeber Inc., Medical Book Department of Harper and Brothers, New York, N.Y., 1959. Price $9.50.

THE YEAR BOOK OF MEDICINE (1959–1960 Year Book Series), edited by *Paul B. Beeson*, M.D., *Carl Muschenheim*, M.D., *William B. Castle*, M.D., *Tinsley R. Harrison*, M.D., *Franz J. Ingelfinger*, M.D., and *Philip K. Bondy*, M.D. 733 pages. The Year Book Publishers Inc., Chicago, Ill., 1959. Price $8.

ELIASON'S SURGICAL NURSING, by *L. Kraeer Ferguson*, A.B., M.D., F.A.C.S., and *Lillian A. Sholtis*, R.N., B.S., M.S. 11th edition. 766 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $6.

NAVAL CUSTOMS AND TRADITIONS AND USAGE, by Vice Admiral *Leland P. Lovette*, U.S. Navy (Retired). 358 pages; illustrated. United States Naval Institute, Annapolis, Maryland, 1959. Price $5.50.

CLINICAL EFFECTS OF ELECTROLYTE DISTURBANCES, The Proceedings of a Conference held in London at the Royal College of Physicians of London, 27th–28th February 1959, edited by *E. J. Ross*. 210 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $4.

HISTORY OF THE AMERICAN DIETETIC ASSOCIATION, 1917–1959, edited by *Mary I. Barber*. 328 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $6.

ESSENTIALS OF MEDICINE, The Art and the Science of Medical Nursing, by *Charles Phillip Emerson, Jr.*, A.B., M.D., and *Jane Sherburn Bragdon*, R.N., B.S., M. Ed. 18th edition. 857 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $6.75.

MASTER YOUR TENSIONS AND ENJOY LIVING, *by George Stevenson*, M.D., and *Harry Milt*. 241 pages. Prentice-Hall, Inc., Englewood, N.J., 1959. Price $4.95.

ESSENTIAL PRINCIPLES OF PATHOLOGY, by *John W. Landells*, M.A., M.B., M.R.C.P., F.Z.S. 278 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $5.

IN THE DENTIST'S OFFICE, A Guide for Auxiliary Dental Personnel, Hygienist, Assistant, Secretary, by *G. Archanna Morrison*. 2d edition. 280 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $7.50.

REGIONAL AND APPLIED ANATOMY OF THE DOMESTIC ANIMALS, by *John A. Taylor*, F.R.C.V.S. Part Two: Thoracic Limb. 205 pages; illustrated. J. B. Lippincott Co., Philadelphia, Pa., 1959. Price $7.50.

ATLAS AND MANUAL OF DERMATOLOGY AND VENEREOLOGY, by Professor Dr. *W. Burckhardt*. Translated and edited by *Stephan Epstein*, M.D. 276 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $14.

SYNOPSIS OF GYNECOLOGY, by *Robert James Crossen*, M.D., *Daniel Winston Beacham*, M.D., and *Woodard Davis Beacham*, M.D. 5th edition. 340 pages; illustrated. C. V. Mosby Co., St. Louis, Mo., 1959. Price $6.50.

CANCER OF THE BREAST, compiled and edited by *Willard H. Parsons*, M.D., F.A.C.S., with a foreword by *Warren H. Cole*, M.D., F.A.C.S. 232 pages; illustrated. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $7.50.

A TEXTBOOK OF GENERAL PHYSIOLOGY, by *Hugh Davson*, D. Sc. (Lond.) 2d edition. 846 pages; illustrated. Little, Brown & Co., Boston, Mass., 1959. Price $14.50.

THE CIBA COLLECTION OF MEDICAL ILLUSTRATIONS, A Compilation of Paintings on the Normal and Pathologic Anatomy of the Digestive System. Part I: Upper Digestive Tract. Prepared by *Frank H. Netter*, M.D., edited by *Ernst Oppenheimer*, M.D. Vol. 3. 206 pages; illustrated. Ciba Pharmaceutical Products, Inc., New York, N.Y., 1959. Price $12.50.

THE FOOT AND ANKLE, Their Injuries, Diseases, Deformities and Disabilities, by *Philip Lewin*, M.D., F.A.C.P., F.I.C.S. 612 pages; illustrated. Lea & Febiger, Philadelphia, Pa., 1959. Price $14.

HEROIC SANCTITY AND INSANITY, An Introduction to the Spiritual Life and Mental Hygiene, by *Thomas Verner Moore*. 243 pages. Grune & Stratton, Inc., New York, N.Y., 1959. Price $5.

NEUROLOGY OF INFANCY, by *Anatole Dekaban*, M.D., Ph. D. 388 pages; illustrated. Williams & Wilkins Co., Baltimore, Md., 1959. Price $12.

WORK AND THE HEART, Transactions of the First Wisconsin Conference on Work and the Heart, edited by *Francis F. Rosenbaum*, M.D., and *Elston L. Belknap*, M.D. 537 pages; illustrated. Paul B. Hoeber, Inc., Medical Book Department of Harper & Brothers, New York, N.Y., 1959. Price $12.

CHEMISTRY OF PANCREATIC DISEASE, by *Harris Busch*, M.D., Ph. D. 160 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $5.25.

MEDICAL DISCOVERIES, Who and When. A dictionary listing thousands of medical and related scientific discoveries in alphabetical order, giving in each case the name of the discoverer, his profession, nationality, and floruit, and the date of the discovery, by *J. E. Schmidt*, Ph. D.S., M.D., Litt. D. 555 pages. Charles C Thomas, Publisher, Springfield, Ill., 1959. Price $14.75.

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